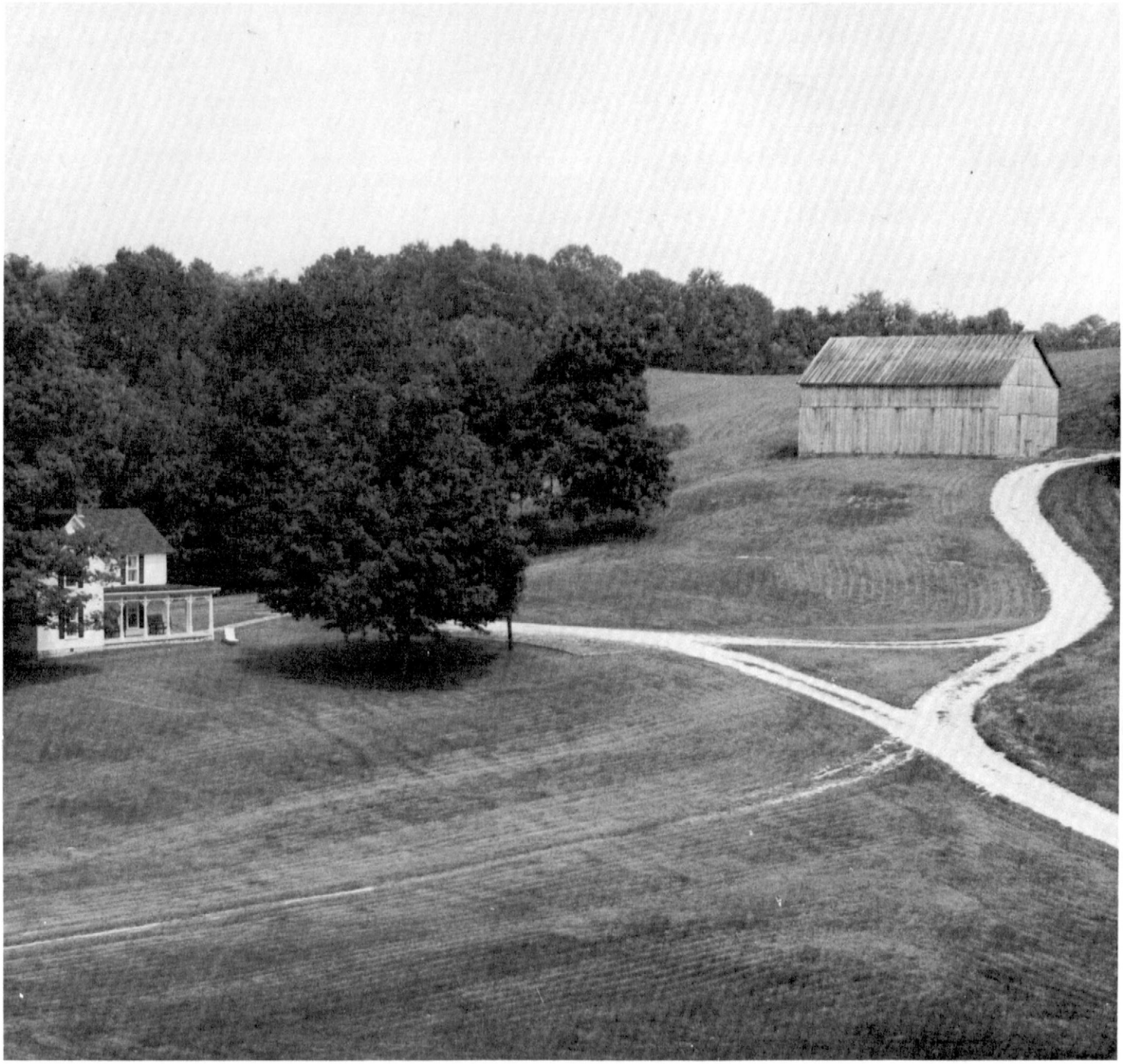
United States
Department of
Agriculture

Soil
Conservation
Service

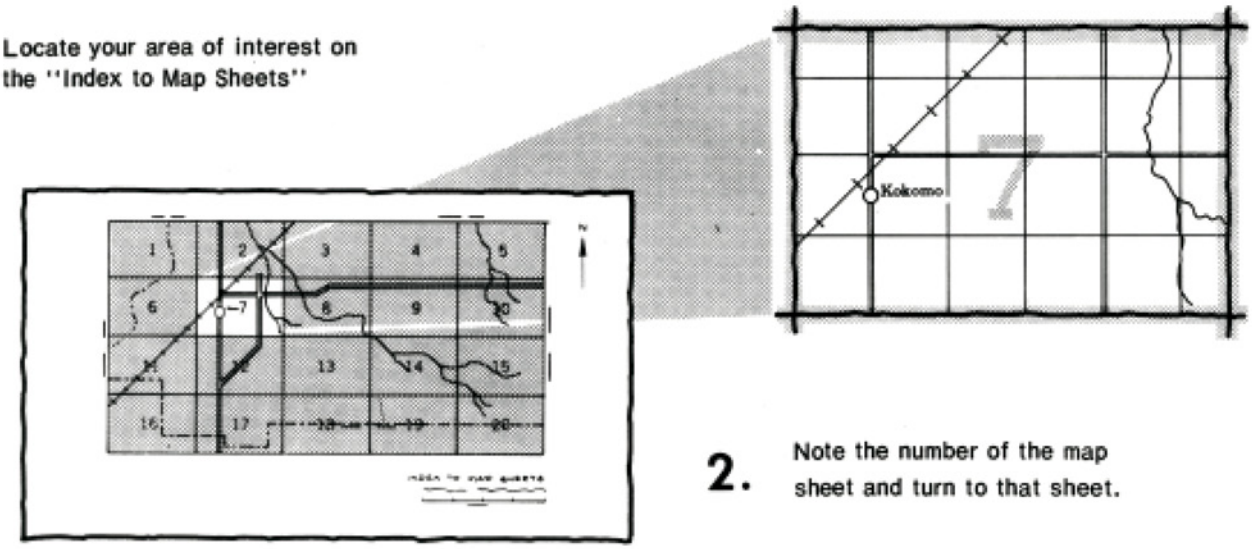
In cooperation with
Kentucky Natural Resources
and Environmental
Protection Cabinet
and Kentucky Agricultural
Experiment Station

Soil Survey of Anderson and Franklin Counties Kentucky



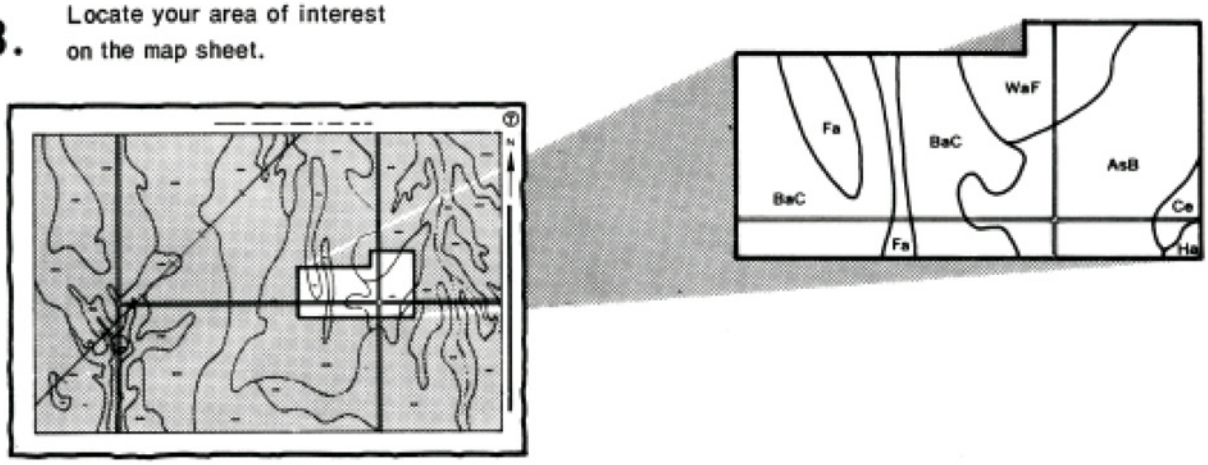
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

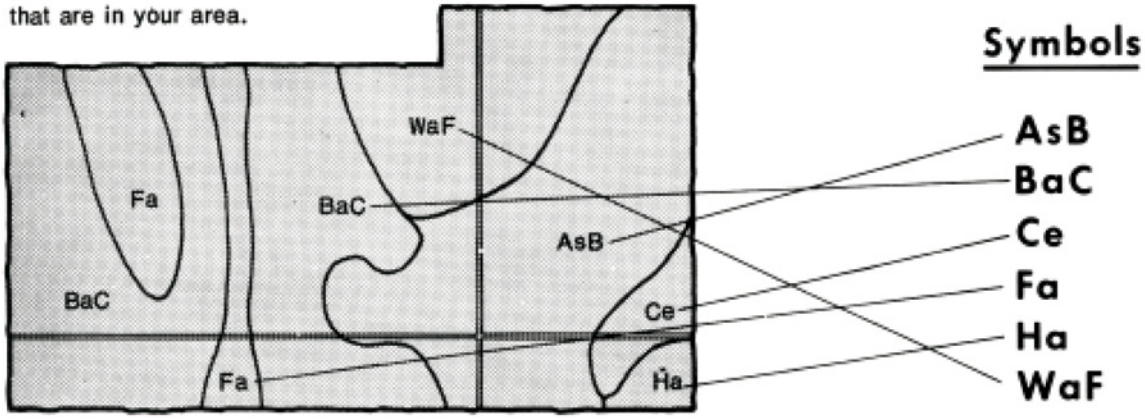


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.

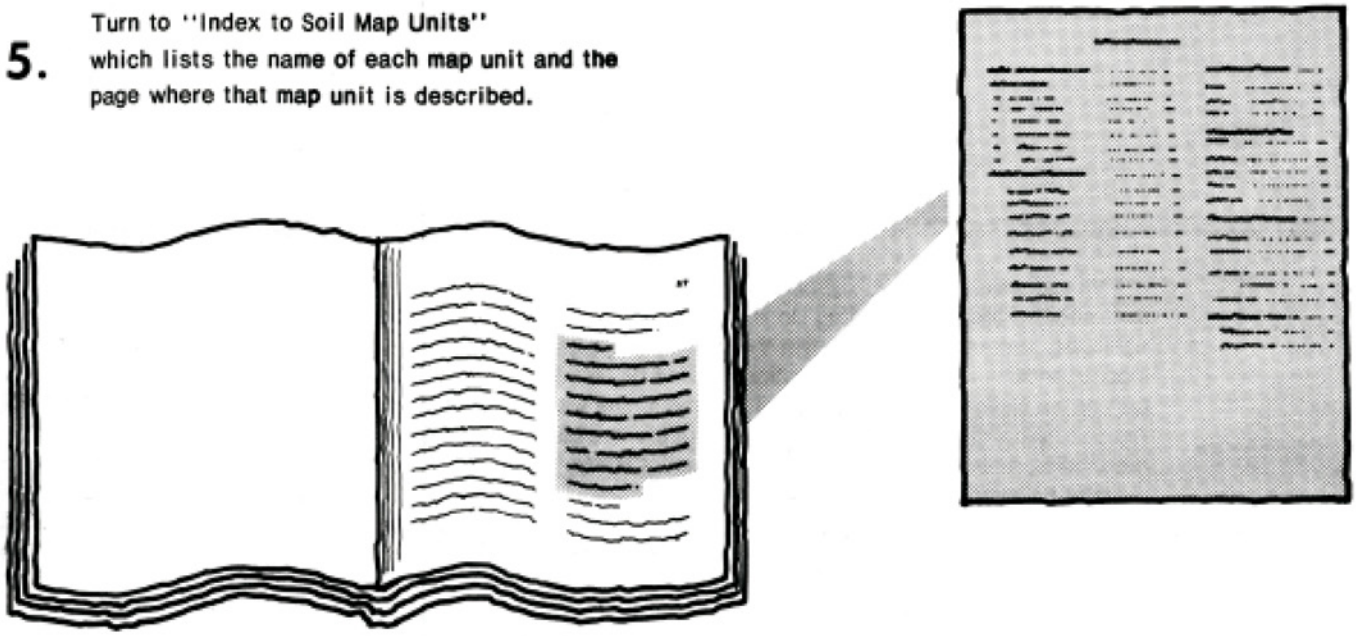


4. List the map unit symbols that are in your area.

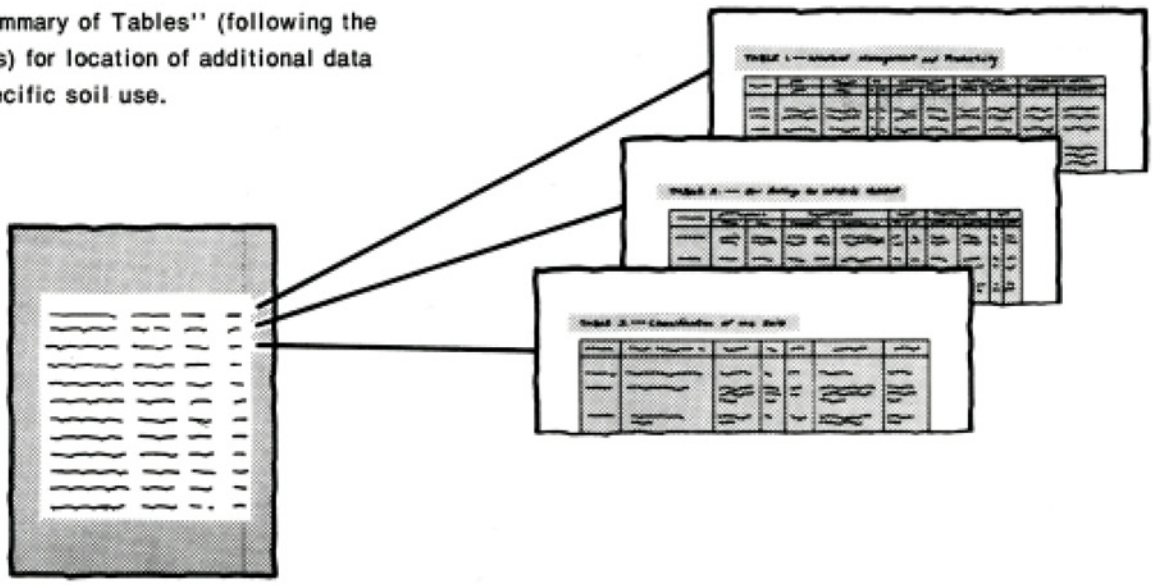


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Soil Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Anderson and Franklin Counties Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Homestead and permanent pasture in an area of Faywood silt loam, 6 to 12 percent slopes. Lowell silt loam, 2 to 6 percent slopes, is on the ridgetop in the background.

Contents

Soil Series

Issued May 1985

Index to Map Units

Summary of Tables

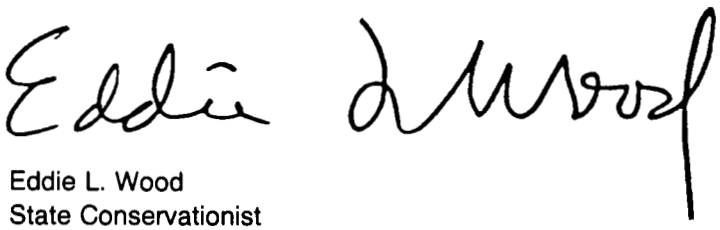
Foreword

This soil survey contains information that can be used in land-planning programs in Anderson and Franklin Counties, Kentucky. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Eddie L. Wood
State Conservationist
Soil Conservation Service

Soil Survey of Anderson and Franklin Counties Kentucky

By Herman P. McDonald, David Keltner, Pamela Wood,
Bruce A. Waters, and Orville J. Whitaker,
Soil Conservation Service

Maps compiled by Dorothy H. Brown

United States Department of Agriculture, Soil Conservation Service
In cooperation with
the Kentucky Natural Resources and Environmental Protection Cabinet
and the Kentucky Agricultural Experiment Station

ANDERSON AND FRANKLIN COUNTIES are in the north-central part of Kentucky (fig. 1). They are in the Kentucky Bluegrass Land Resource Area (*18*). The total combined area is 417 square miles, or 266,880 acres. Anderson County is 131,840 acres, and Franklin County is 135,040 acres. According to the 1980 census, the population of Anderson County was 12,200, and the population of Franklin County was 41,830. Lawrenceburg is the county seat of Anderson County, and Frankfort, which is the ninth largest city in the state, is also the capital of Kentucky.

The landscape of the two counties is one of gently sloping to steep hills. The counties are dissected by the Kentucky River, Elkhorn Creek, Salt River, and their tributaries. Elevation ranges from about 450 to 920 feet above sea level.

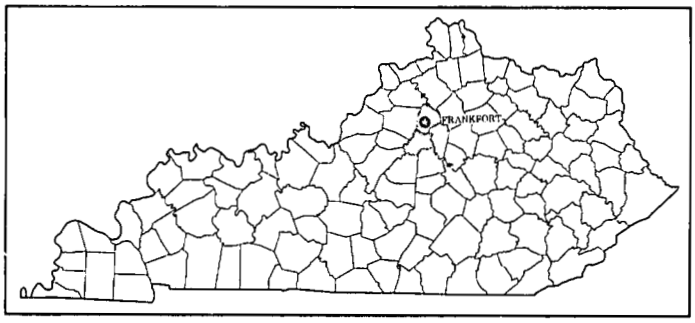


Figure 1.—Location of Anderson and Franklin Counties in Kentucky.

The first soil survey of Franklin County was published in 1915 (*15*). This survey updates the first survey of Franklin County and provides additional information.

General Nature of the Survey Area

This section gives general information concerning the survey area. It discusses history, geology, climate, natural resources, farming, and industry, transportation, and markets.

History

In 1827, Anderson County was formed from parts of Franklin and Mercer Counties (*20*). It was named in honor of Richard Anderson, Jr., who was a congressman and foreign ambassador. Lawrenceburg, the county seat, was formerly known as Koffmans Station. It served as a stopping point between Harrodsburg and Frankfort. In 1820, the county seat had been incorporated as Lawrence, but the name was changed to Lawrenceburg in 1827. The name honors Capt. James Lawrence, commander of the *Chesapeake,* famous for his command, "Don't give up the ship."

Figure 2.—The Kentucky Capitol in Frankfort. The soil is Elk silt loam, 2 to 6 percent slopes.

Franklin County was formed from parts of Woodford, Mercer, and Shelby Counties in 1794. It was named for Benjamin Franklin (*6*). Subsequently, Anderson, Gallatin, and Owen Counties were formed from parts of Franklin County. This gave the county its present boundaries. Frankfort, the county seat, was founded by General James Wilkinson. The town was named for a pioneer friend of Wilkinson's, named Frank, who had a ford at the Kentucky River near the site. "Frank's Ford" became Frankfort. The city was established as the State capital in 1792 (fig. 2).

Most of the early settlers in Anderson and Franklin Counties came from Pennsylvania down the Ohio River to Kentucky, or they came from the Carolinas through the Cumberland Gap. Tobacco, hemp, and whiskey production were the major early enterprises.

Geology

Anderson and Franklin Counties are in the Hills of the Bluegrass, the Outer Bluegrass, and the Inner Bluegrass Physiographic Regions of Kentucky (*4*). Most soils on uplands formed in material derived from sedimentary rock of the Ordovician System (*9, 10, 11, 12*).

The Clays Ferry Formation of the Late Ordovician System provides the parent material from which the Eden soils are derived (fig. 3). The ridgetops of this formation are capped in many places with Calloway Creek Limestone. This limestone provides the parent material for the Lowell and Faywood soils in the Outer Bluegrass Physiographic Region.

The parent material of most of the soils in the Inner Bluegrass Physiographic Region formed from Lexington

Limestone. Maury and McAfee soils are on the upper Tanglewood, Millersburg, and Devils Hollow Members of this formation. Some of the Lowell and Faywood soils are at lower elevations of the Tanglewood Member.

Most soils on the flood plains and stream terraces are derived from alluvium of the Quaternary System. Some of the ridgetops above the Kentucky River are capped with fluvial deposits from the Tertiary or Quaternary Systems. These deposits provide the parent material of the Elk and Otwell phases on uplands.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Frankfort in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 34 degrees F, and the average daily minimum temperature is 23

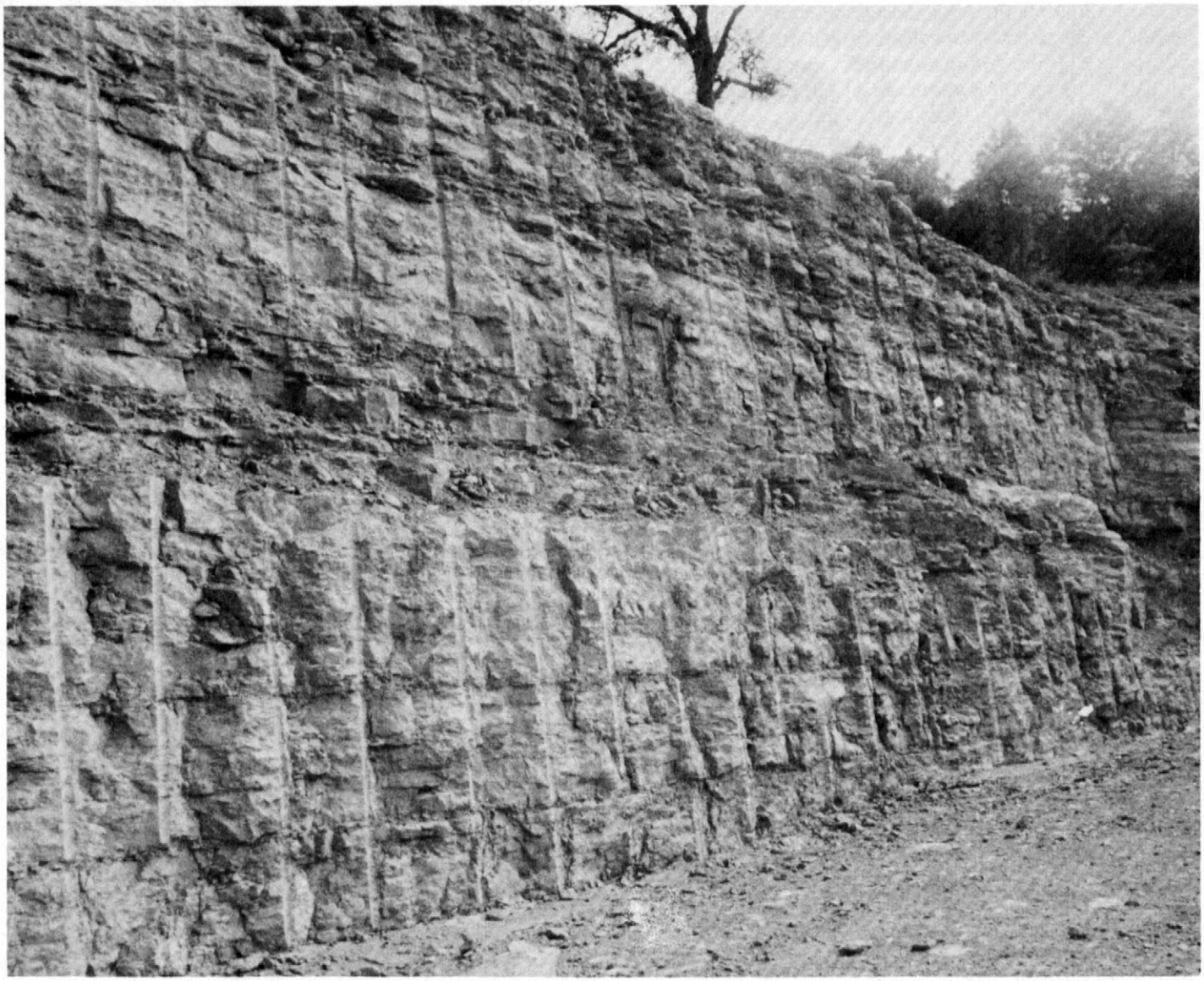


Figure 3.—Road cut shows bedrock of the Clays Ferry Formation.

degrees. The lowest temperature on record, which occurred at Frankfort on January 29, 1963, is -20 degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Frankfort on July 15, 1954, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 46 inches. Of this, 23 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 4.33 inches at Frankfort on May 8, 1961. Thunderstorms occur on about 50 days each year, and most occur in summer.

The average seasonal snowfall is 11 inches. The greatest snow depth at any one time during the period of record was 16 inches. On an average of 6 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 12 miles per hour, in early spring.

Natural Resources

Soil is the most important natural resource in the survey area. Livestock, hay, and grain crops are marketable products.

Water is adequate for domestic use throughout the survey area. Approximately 80 percent of the residents of Franklin County are served by community water districts (*5*). About 40 percent of Anderson County is served by community water systems.

The Kentucky River supplies water for recreation and water transportation. Locks and dams insure sufficient depths to navigate upstream to Frankfort. Taylorsville Lake, which is near Van Buren in Anderson County, provides fishing, boating, and skiing. Elkhorn Creek also is an important source of water in eastern Franklin County. Farm ponds and small lakes throughout the survey area are sources for watering livestock and for fishing and swimming.

Several limestone quarries in the survey area supply limestone for agriculture, industry, and roadbuilding (*9*).

Farming

Anderson and Franklin Counties are dominantly agricultural. According to the 1978 U.S. Census of Agriculture, 641 farms in Anderson County averaged 185 acres each (*19*). In Anderson County, 69 percent of the 131,840 acres was farmland. In Franklin County, 824 farms averaged 128 acres in 1978. Seventy-eight percent of the 135,040 acres in Franklin County was farmland. A large number of the residents are part-time farmers who also work for industries or state government.

At present, the income in Anderson County from livestock production is somewhat higher than that of crop production. In Franklin County, however, the income from crop production is about 6 times greater than that of livestock production. This is attributed to the large amount of burley tobacco planted in Franklin County. Tobacco, corn, and small grain are the main cash crops in both counties. Dairy and beef cattle operations are dominant in Anderson County, while beef cattle is the main livestock enterprise in Franklin County. Thoroughbred race horses are also raised in the two counties (fig. 4).

Industry, Transportation, and Markets

Although many of the people of Anderson and Franklin Counties are engaged in farming, industry is also important to the economy. Several small factories are at Frankfort and Lawrenceburg. Many residents work for agencies of the State government at Frankfort (fig. 5). A large number commute to work in Lexington and Louisville or nearby towns.

Transportation facilities include a network of federal, state, and county highways that provide access to all of the survey area. Being the center of State government, Frankfort has a complex traffic pattern, especially when the legislature is in session. A newly constructed four-lane highway leads to the State capitol and to Kentucky State University.

The Louisville and Nashville Railroad serves Franklin County, and the Southern Railway serves Anderson County. Sand from the Ohio River is shipped by barge up the Kentucky River from Carrollton to Frankfort.

The principal trading centers are Frankfort and Lawrenceburg. Some of the dairy products are marketed at a cheese plant at Lawrenceburg. Most of the burley tobacco is sold at Lexington and Shelbyville. Whiskey distilleries are located in both Anderson and Franklin Counties.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a

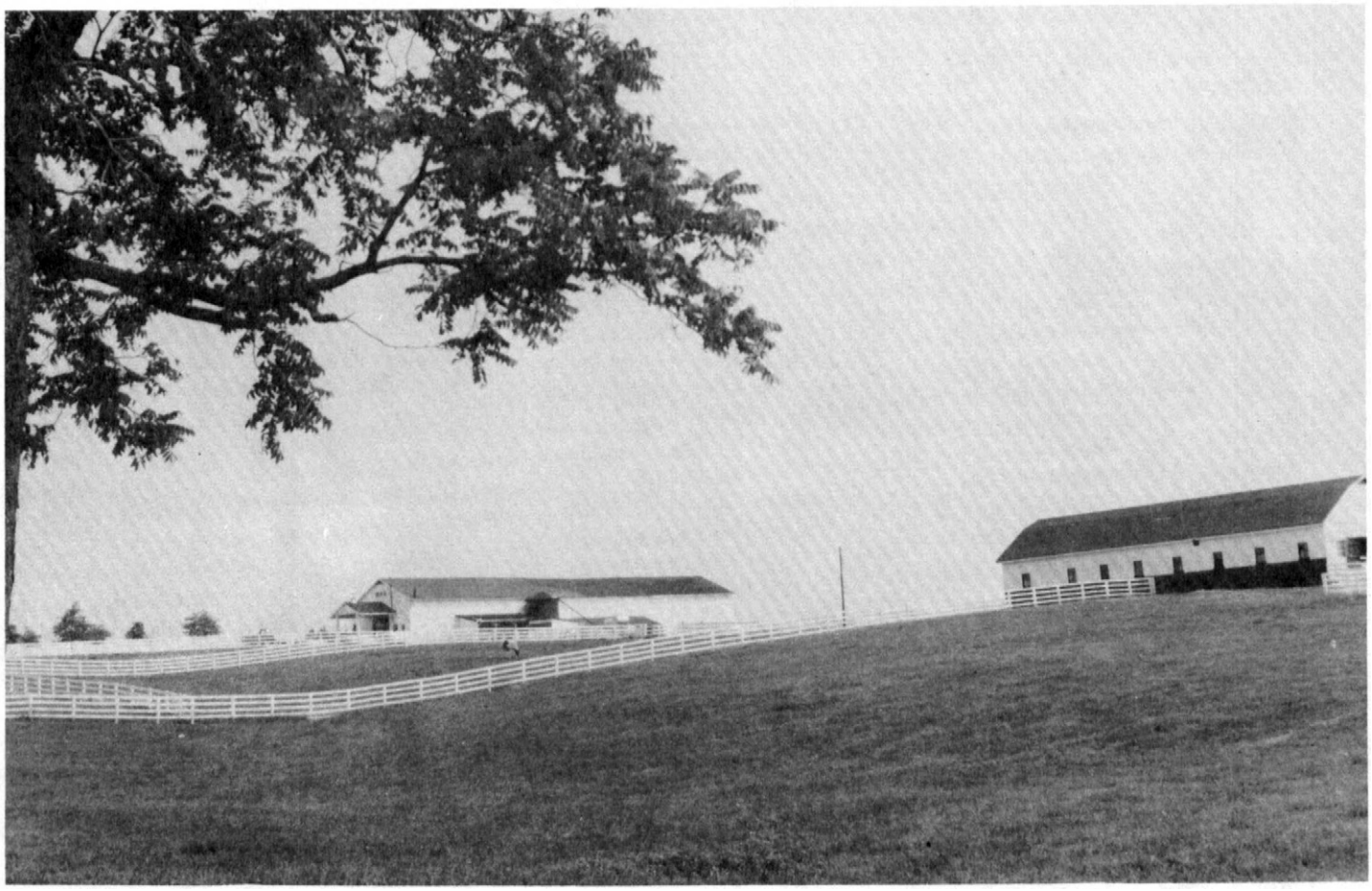


Figure 4.—Thoroughbred race horses are raised on this farm, in an area of McAfee silt loam, 6 to 12 percent slopes.

description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After

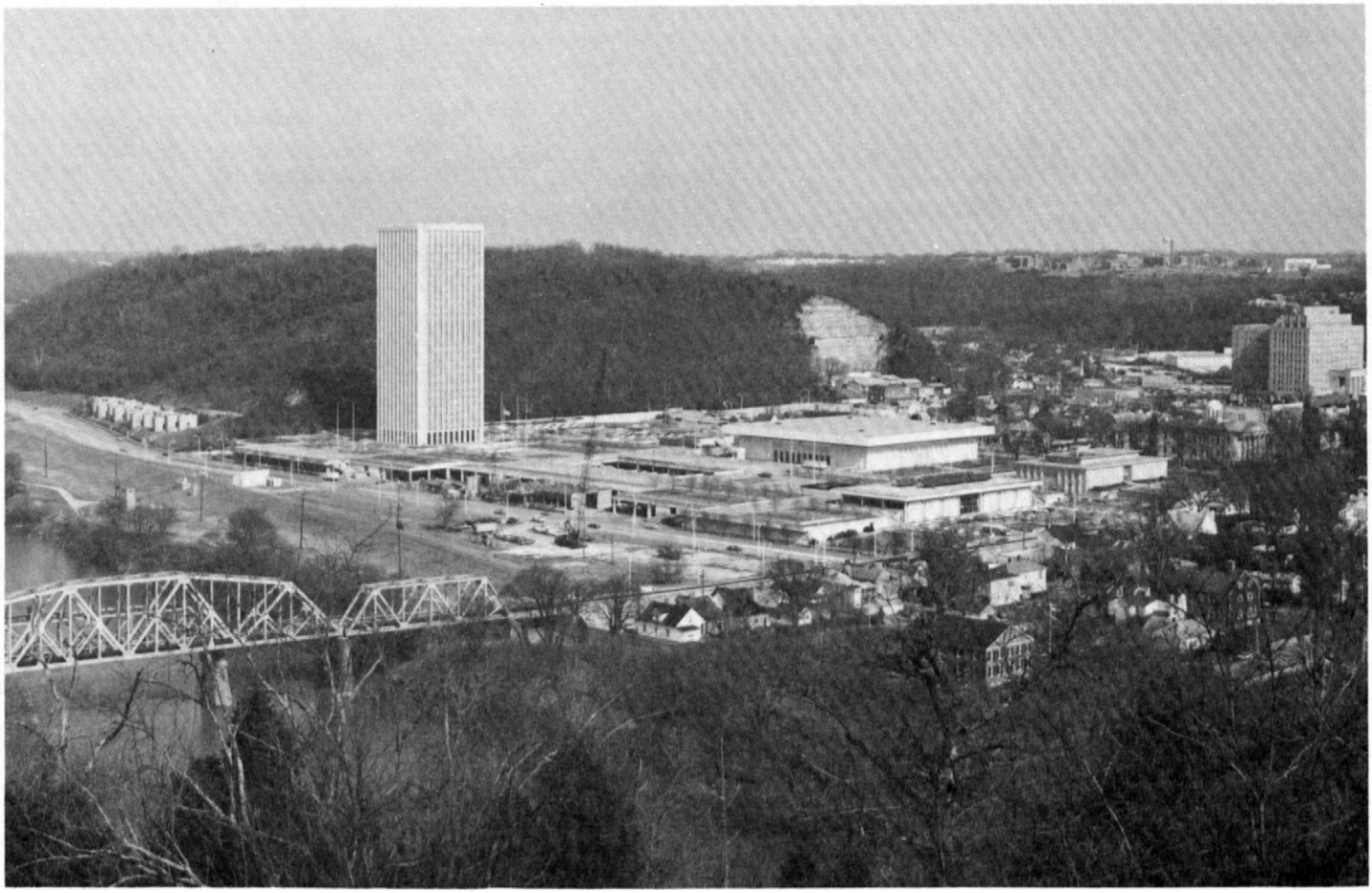


Figure 5.—A State government office complex on Elk silt loam, 2 to 6 percent slopes. The wooded area in the background is part of the Fairmount-Rock outcrop complex, 30 to 60 percent slopes. The Kentucky River is in the foreground.

describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from

year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils in the detailed soil map units, and in the general soil map units they are called soils of minor extent.

Most inclusions in the detailed soil map units have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions of Anderson County

1. Eden

Moderately deep, well drained soils that have a clayey subsoil; on strongly sloping to steep hillsides and sloping to strongly sloping ridgetops

This map unit consists of a highly dissected area on hillsides; on narrow, winding ridgetops; and in V-shaped valleys (fig. 6). It is mainly in the western two-thirds of Anderson County.

This map unit makes up about 63 percent of Anderson County. It is about 62 percent Eden soils and 38 percent soils of minor extent.

The Eden soils are on strongly sloping to steep hillsides and on sloping to strongly sloping ridgetops. Typically, these moderately deep, well drained soils have a clayey surface layer and subsoil. Limestone fragments are throughout. Interbedded calcareous shale, siltstone, and limestone are below the subsoil.

Of minor extent are Faywood, Lowell, and Nicholson soils on uplands and Boonesboro soils on the narrow flood plains.

Most of the acreage of this map unit is wooded or in brush, but some of the acreage is in pasture. Most areas of minor soils are used for pasture, hay, and burley tobacco. The main enterprises are beef cattle and burley tobacco farms and a few dairy farms.

Most of the soils in this map unit have moderately high productivity for trees. Management concerns are a moderate hazard of erosion on strongly sloping to steep soils, moderate seedling mortality, and moderate plant competition and equipment limitations.

Most of the acreage is poorly suited to farming and urban uses because of the steep slopes. The smoother areas are suited to pasture and hay, but grasses and legumes are difficult to establish and maintain.

2. Faywood-Lowell

Moderately deep and deep, well drained soils that have a clayey subsoil; on strongly sloping to moderately steep hillsides and on gently sloping to sloping ridgetops

This map unit consists of a dissected area on ridgetops and hillsides. Ridgetops are gently sloping and sloping, and hillsides are strongly sloping to moderately steep. This area is in the eastern one-third of Anderson County (fig. 7).

This map unit makes up about 28 percent of Anderson County. It is about 46 percent Faywood soils, 34 percent Lowell soils, and 20 percent soils of minor extent.

The Faywood soils are on sloping ridgetops and strongly sloping to moderately steep hillsides. They are mainly below the Lowell soils, which are on the higher, gently sloping ridgetops and sloping shoulder slopes. The Faywood soils are moderately deep, and the Lowell soils are deep. Both soils are well drained. Typically, they have a loamy surface layer and clayey subsoil and are underlain by limestone interbedded with thin layers of calcareous shale and siltstone.

Of minor extent in this unit are Nicholson soils, which formed in a mantle of silty loess underlain by residuum of limestone, calcareous shale, and siltstone and Elk soils, which formed in old alluvial deposits. These soils are on uplands. Some small areas of Nolin and Newark soils are on narrow flood plains.

Most of the soils in this map unit are used for pasture, hay, or cultivated crops. Beef cattle, dairy, and burley tobacco farms are the major enterprises. A few horse farms are in the area. A considerable acreage is used for urban development.

Soils on the ridgetops and shoulder slopes are suited to cultivated crops, but erosion is a moderate to severe hazard. Soils on the hillsides are suited to pasture, hay, and woodland.

The gently sloping soils are suited to urban uses, but clayey texture, moderately slow to slow permeability of the subsoil, and depth to bedrock are limitations. The steeper soils are poorly suited to urban uses.

3. Fairmount-Rock outcrop-McAfee

Shallow and moderately deep, well drained soils that have a clayey subsoil and Rock outcrop; on strongly sloping to very steep hillsides and bluffs and on sloping ridgetops

This unit consists of a highly dissected area on hillsides, bluffs, and ridgetops. The ridgetops are sloping. The upper part of the hillsides is strongly sloping, and the lower part of the hillsides and the bluffs are moderately steep to very steep (fig. 8). This area is in the extreme eastern part of Anderson County.

This map unit makes up about 9 percent of Anderson County. It is about 37 percent Fairmount soils, 16 percent Rock outcrop, 14 percent McAfee soils, and 33 percent soils of minor extent.

The Fairmount soils are on the steep and very steep bluffs above the Kentucky River and on moderately steep hillsides above the smaller streams. These soils are shallow and well drained. Typically, they have a clayey surface layer and subsoil. Limestone fragments are throughout. The Fairmount soils are underlain by limestone interbedded with thin layers of calcareous shale and siltstone.

Rock outcrop occurs in areas of the Fairmount soils and in the strongly sloping areas of the McAfee soils. Outcrops are most prominent and numerous on the steeper bluffs.

The McAfee soils are on the sloping ridgetops and strongly sloping hillsides. They are above the Fairmount soils. The moderately deep McAfee soils are well drained. Typically, they have a loamy surface layer and a

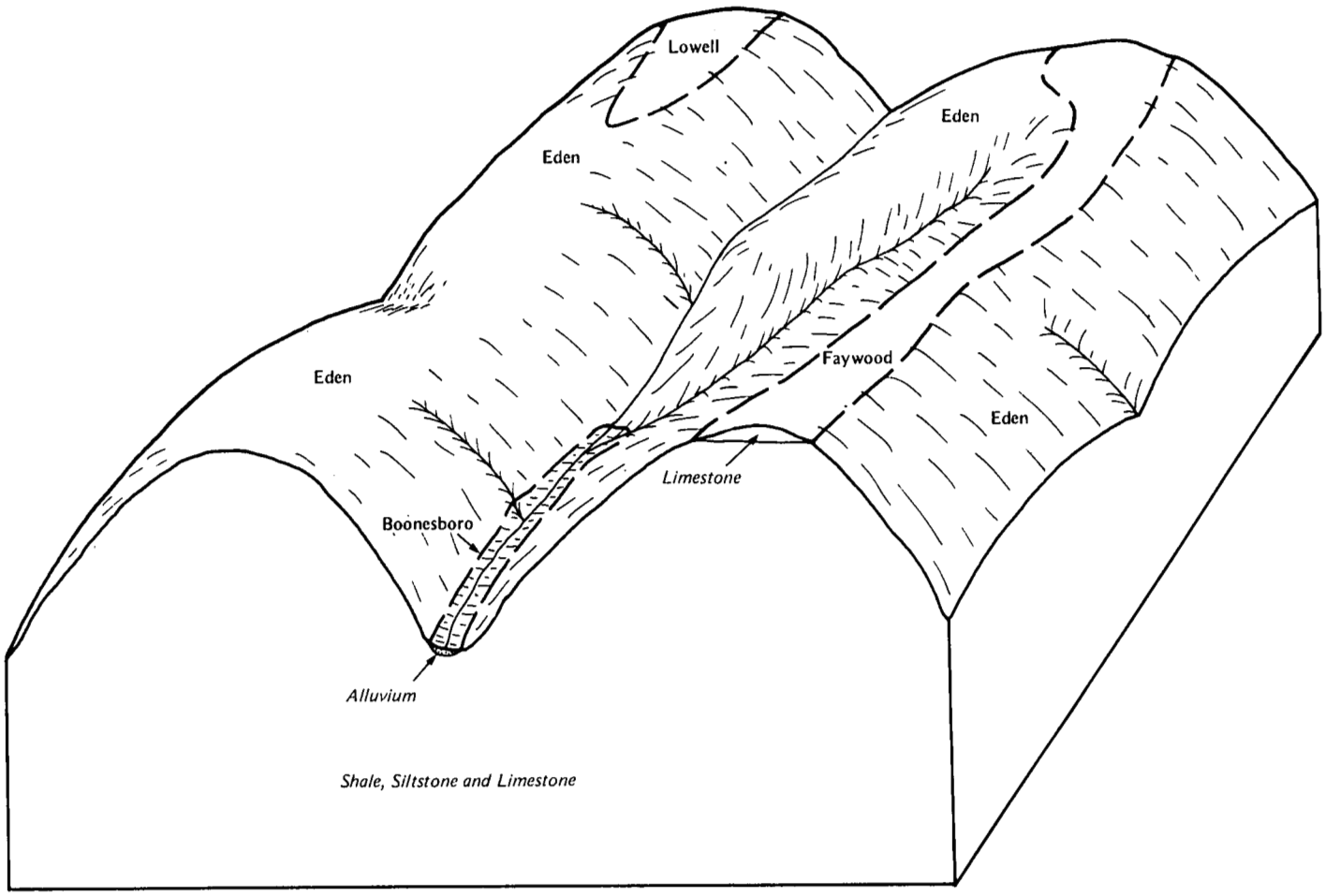


Figure 6.—Relationship of soils to topography and underlying material in the Eden unit.

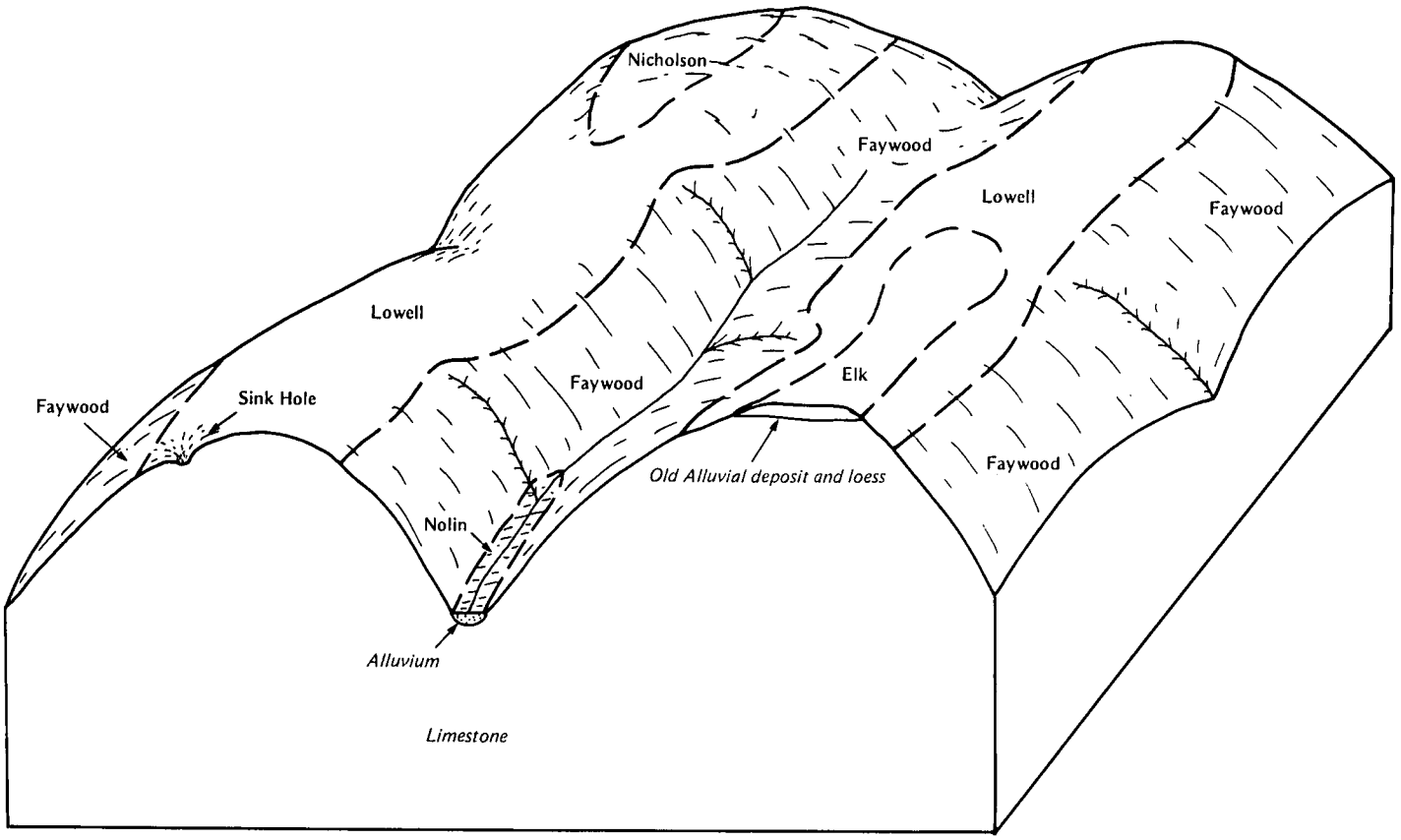


Figure 7.—Relationship of soils to topography and underlying material in the Faywood-Lowell unit.

clayey subsoil and are underlain by limestone.

Of minor extent are Faywood, Lowell, and Elk soils on uplands. The Elk soils formed in old alluvial deposits. Some small areas of Nolin and Newark soils are on narrow flood plains.

Most of the acreage is woodland. Some of the acreage is in pasture. In places the minor soils are planted to burley tobacco and hay.

The productivity for trees is low to moderately high. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns for woodland.

Most of the acreage is poorly suited to crops, pasture, and urban uses because of steep slope, shallowness to bedrock, and Rock outcrop.

Soil Descriptions of Franklin County

1. Eden

Moderately deep, well drained soils that have a clayey subsoil; on strongly sloping to steep hillsides and on sloping to strongly sloping ridgetops

This map unit consists of highly dissected areas on hillsides; on narrow, winding ridgetops; and in V-shaped valleys. It is mainly in the western and northeastern parts of Franklin County.

This map unit makes up about 53 percent of Franklin County. It is about 62 percent Eden soils and 38 percent soils of minor extent.

The Eden soils are on strongly sloping to steep hillsides and on sloping to strongly sloping ridgetops. Typically, these moderately deep, well drained soils have a clayey surface layer and subsoil. Limestone fragments are throughout. Interbedded calcareous shale, siltstone, and limestone are below the subsoil.

Of minor extent in this unit are Faywood, Lowell, and Nicholson soils on uplands and Boonesboro soils on the narrow flood plains.

Most of the acreage is in woods or brush, but some of the acreage is used for pasture. Most areas of the minor soils are used for pasture, hay, and cultivated crops. The

main enterprises are raising beef cattle and growing burley tobacco.

Most of the soils in this map unit have moderately high productivity for trees. Management concerns are a moderate hazard of erosion on strongly sloping to steep soils and moderate seedling mortality, plant competition, and equipment limitations.

Most of the acreage is poorly suited to farming and urban uses because of the steep slopes. The smoother areas are suited to pasture and hay, but grasses and legumes are difficult to establish and maintain.

2. Elk-McAfee-Otwell

Deep, well drained and moderately well drained soils that have a loamy subsoil, on nearly level to strongly sloping stream terraces, and moderately deep, well drained soils that have a clayey subsoil, on gently sloping to strongly sloping, low uplands

This map unit consists of a long, relatively narrow, irregularly shaped area along the Kentucky River. It is in the central part of Franklin County (fig. 9).

This map unit makes up about 6 percent of Franklin County. It is about 53 percent Elk soils, 13 percent McAfee soils, 12 percent Otwell soils, and 22 percent soils of minor extent.

The Elk soils are on gently sloping to strongly sloping, low stream terraces and on nearly level intermediate stream terraces. Typically, these deep, well drained soils are loamy throughout.

McAfee soils are on gently sloping to strongly sloping, low ridges and hillsides of uplands. Areas of these soils are generally surrounded by adjacent stream terraces. Typically, these moderately deep, well drained soils have

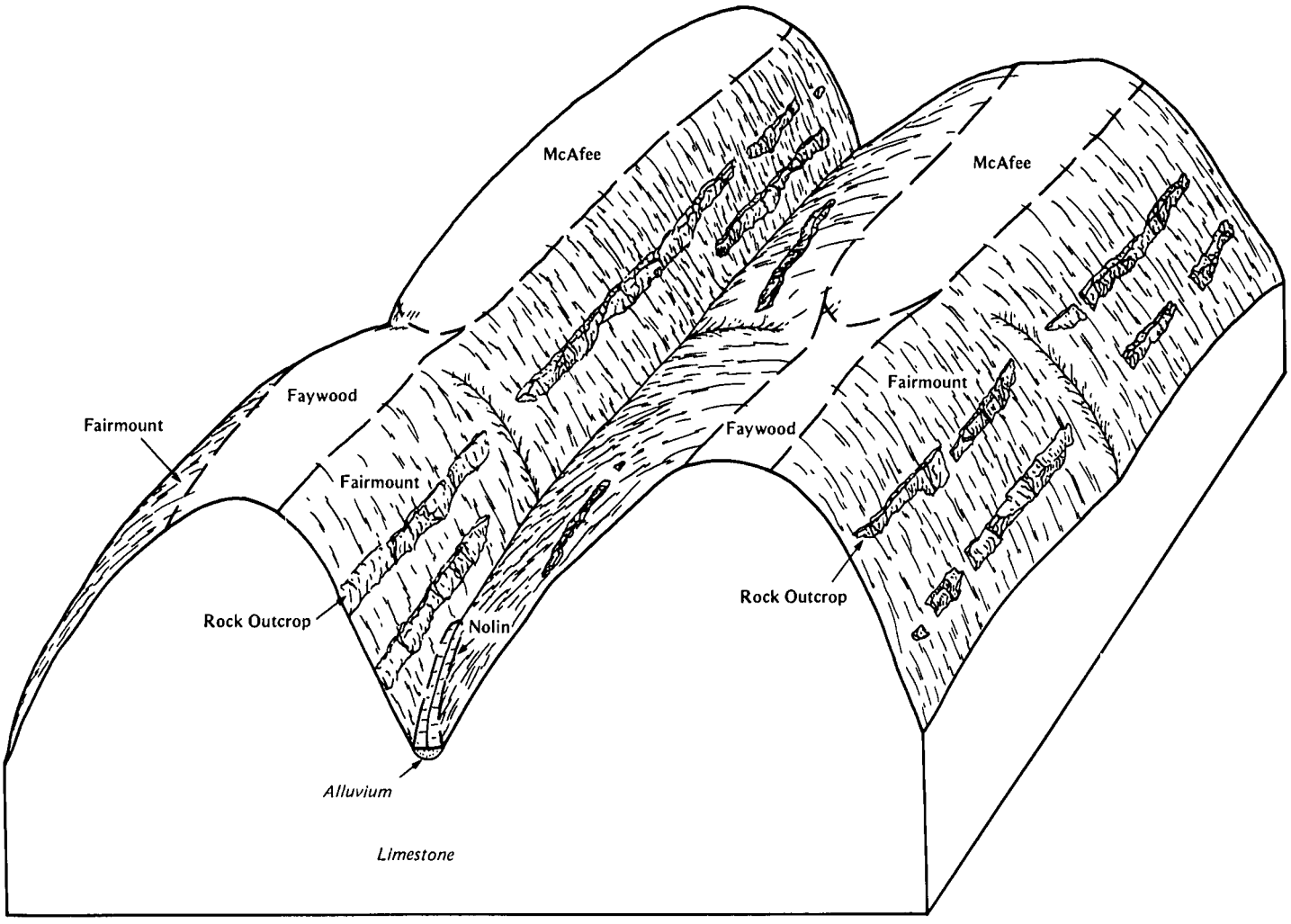


Figure 8.—Relationship of soils to topography and underlying material in the Fairmount-Rock outcrop-McAfee unit.

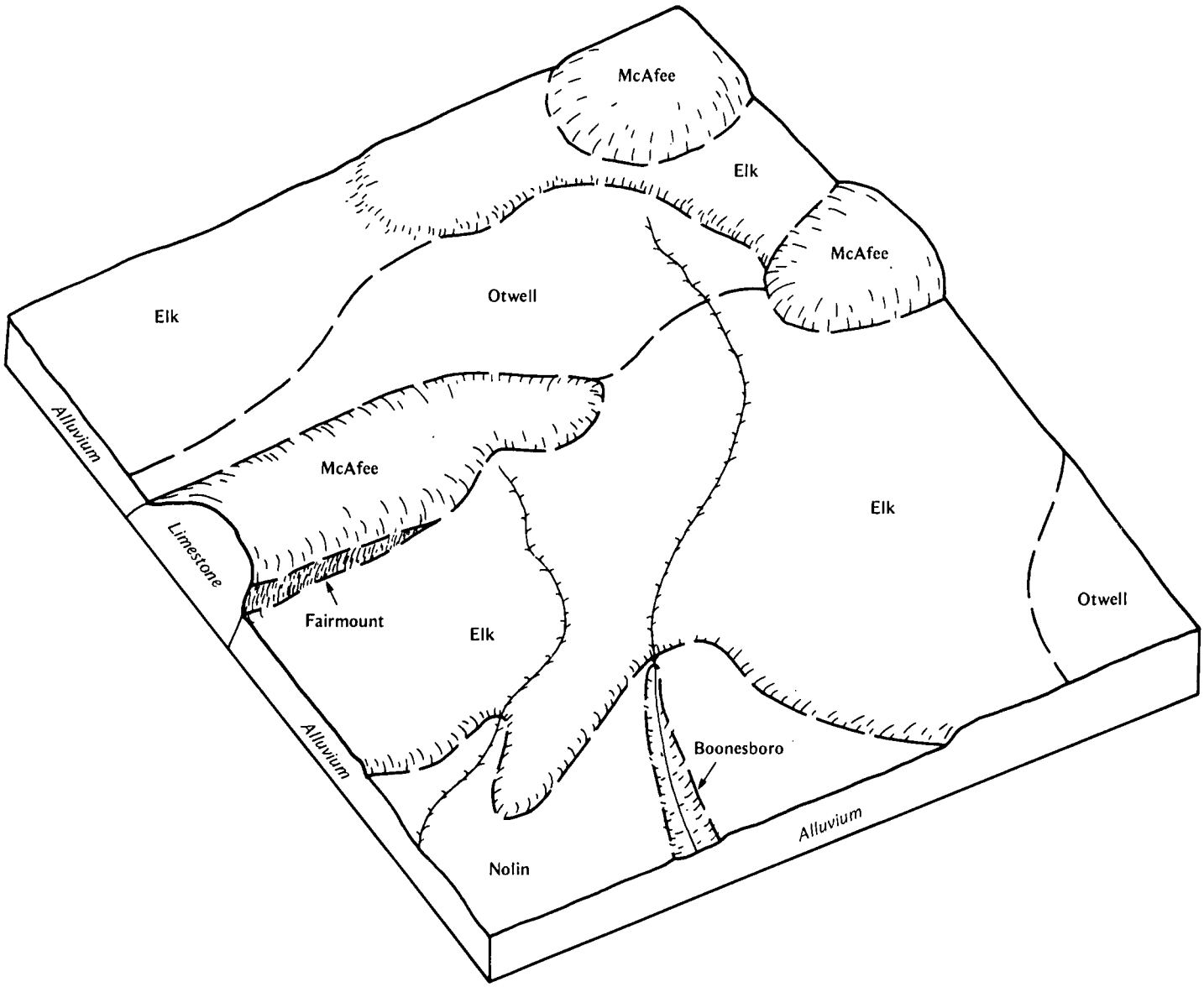


Figure 9.—Relationship of soils to topography and underlying material in the Elk-McAfee-Otwell unit.

a loamy surface layer and a clayey subsoil.

The Otwell soils are on nearly level to gently sloping, low stream terraces. They are deep and moderately well drained. They have a compact and brittle layer or fragipan at a depth of about 2 feet. Typically, they are loamy throughout.

Of minor extent are the Nolin, Newark, and Boonesboro soils on flood plains and the Lawrence soils on stream terraces.

Most of the acreage of this map unit is in cultivated crops, hay, and pasture. The cultivated crops are mainly burley tobacco and corn. Some areas of the steeper McAfee soils are in pasture or are woodland. The city of Frankfort takes up a considerable acreage.

Soils in this unit are suited to cultivated crops. The sloping and strongly sloping soils are well suited to hay and pasture. Some of the Elk and Otwell soils are subject to rare flooding for brief periods late in winter and early in spring. Most of the minor soils on flood plains are subject to occasional flooding at that season. Erosion is a severe or very severe hazard when cultivated crops are grown in the more sloping areas of Elk and McAfee soils. The soils have high productivity for trees.

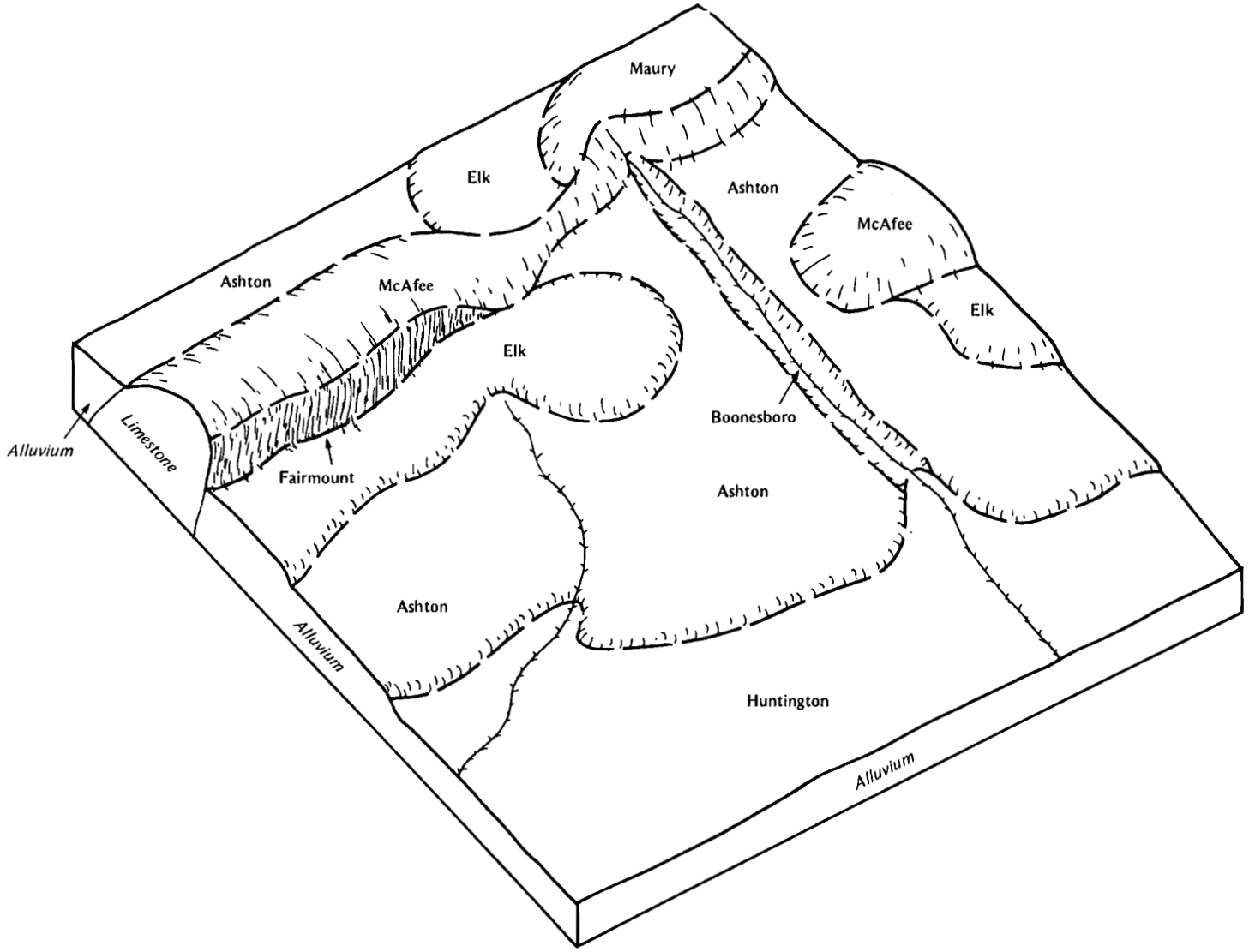


Figure 10.—Relationship of soils to topography and underlying material in the Ashton-Huntington-Elk unit.

Flooding is a major limitation for urban uses on some stream terraces. Terraces that are not flooded are suited to urban development. Wetness and moderately slow and very slow permeability are limitations in some areas. The gently sloping, upland soils are suited to urban development, but clayey texture, slow permeability, and depth to bedrock are limitations. The steeper soils are poorly suited to this use.

3. Ashton-Huntington-Elk

Deep, well drained soils that have a loamy subsoil; on nearly level to strongly sloping, low stream terraces and flood plains

This map unit consists of a long, narrow area of nearly level to strongly sloping soils along Elkhorn Creek and its tributaries. It is in the eastern part of Franklin County (fig. 10).

This map unit makes up about 7 percent of Franklin County. It is about 28 percent Ashton soils, 17 percent Huntington soils, 14 percent Elk soils, and 41 percent soils of minor extent.

The Ashton soils are on nearly level and gently sloping, low stream terraces. The Huntington soils are on flood plains adjacent to streams. Typically, the Elk soils

are on the higher stream terraces. All of these soils are deep, well drained, and loamy throughout.

Of minor extent are Maury, McAfee, and Fairmount soils on uplands and Boonesboro soils on flood plains.

Most of the acreage is used for cultivated crops, hay, and pasture. The row crops are mainly burley tobacco and corn.

The soils in this map unit are well suited to cultivated crops. The Ashton soils and some areas of the Elk soils are subject to rare flooding. Huntington soils are subject to occasional flooding. Flooding is brief, usually late in winter and early in spring. Erosion is a severe to very severe hazard on the sloping and strongly sloping soils.

The soils are well suited to pasture and hay, although flooding is a problem for some legumes. The soils have very high productivity for trees.

Flooding is the major limitation for urban uses. The areas not subject to flooding are suited to most urban development.

4. McAfee-Faywood-Fairmount

Moderately deep and shallow, well drained soils that have a clayey subsoil; on sloping ridgetops and on strongly sloping to very steep hillsides and bluffs

This map unit consists of highly dissected areas on ridgetops, hillsides, and bluffs. Ridgetops are relatively smooth and sloping. Hillsides and bluffs are strongly sloping to very steep. These areas are in south-central Franklin County (fig. 11).

This map unit makes up about 10 percent of Franklin County. It is about 28 percent McAfee soils, 20 percent Faywood soils, 14 percent Fairmount soils, and 38 percent soils of minor extent. Some Rock outcrop is also included.

The McAfee soils are on the sloping ridgetops and strongly sloping hillsides. They generally are on the highest part of the landscape. These soils are moderately deep and well drained and are underlain by

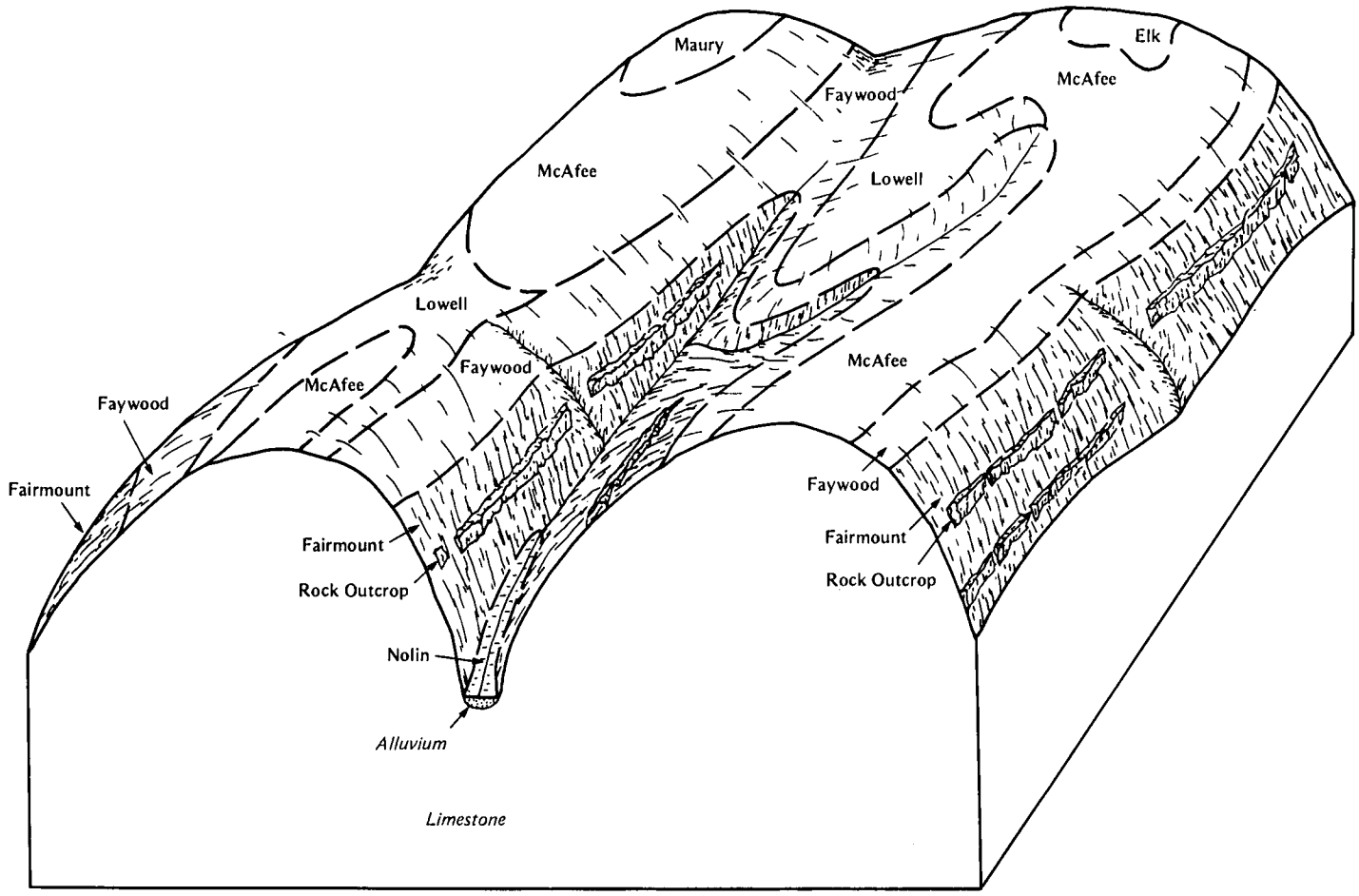


Figure 11.—Relationship of soils to topography and underlying material in the McAfee-Faywood-Fairmount unit.

limestone. The Faywood soils are on the strongly sloping to moderately steep, medium-sized hills. They are moderately deep and well drained. The Fairmount soils are on the steep and very steep bluffs and are below the McAfee and Faywood soils. They are shallow and well drained. Both the Faywood and Fairmount soils are underlain by limestone interbedded with thin layers of calcareous shale and siltstone. All three soils in this map unit have a loamy surface layer and a clayey subsoil. Rock outcrop is common on the bluffs.

Of minor extent are Lowell soils, which formed in clayey residuum weathered from limestone interbedded with thin layers of calcareous shale and siltstone; Maury soils, which formed in silty loess and residuum weathered from phosphatic limestone; and Elk soils, which formed in old alluvial deposits. All of these soils are on uplands. The minor Boonesboro and Nolin soils are on narrow flood plains.

Most of the acreage is used as pasture. Some of the acreage is woodland. A few of the minor soils are cropped to burley tobacco and hay. The city of Frankfort covers some of the acreage.

Most of the acreage is poorly suited to crops and to urban development because of steep slope, shallowness to bedrock, and Rock outcrop. The sloping ridgetops are suited to pasture and hay.

The soils in this map unit have moderately high productivity for trees. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

5. Faywood-Lowell

Moderately deep and deep, well drained soils that have a clayey subsoil; on strongly sloping to moderately steep hillsides and on gently sloping to sloping ridgetops

This map unit consists of a dissected area on ridgetops and hillsides. Ridgetops are gently sloping and sloping, and hillsides are strongly sloping to moderately steep. The map unit is in the southwestern part of Franklin County.

This map unit makes up about 11 percent of Franklin County. It is about 30 percent Faywood soils, 28 percent Lowell soils, and 42 percent soils of minor extent.

The Faywood soils are on the sloping ridgetops and the strongly sloping to moderately steep hillsides. They are generally at lower elevations than the Lowell soils. The Lowell soils are on the higher, gently sloping ridgetops and on sloping shoulder slopes. The Faywood soils are moderately deep, and the Lowell soils are deep. Both soils are well drained. Typically, they have a loamy surface layer and a clayey subsoil. They are underlain by limestone interbedded with thin layers of calcareous shale and siltstone.

Of minor extent are Nicholson soils and Elk soils. Elk soils formed in old alluvial deposits. Nicholson and Elk soils are on uplands. Some small areas of Nolin and Newark soils are on narrow flood plains.

Most of the acreage is used for pasture, hay, and cultivated crops. Beef cattle, dairy, and burley tobacco farms are the major enterprises. A few horse farms are in the area. A considerable acreage is in urban uses.

Soils on the ridgetops and shoulder slopes are suited to cultivated crops, but erosion is a moderate to severe hazard. Soils on the hillsides are suited to pasture, hay, and woodland.

The gently sloping soils are suited to urban development, but clayey texture, moderately slow to slow permeability in the subsoil, and depth to bedrock are limitations. The steeper soils are poorly suited to urban development.

6. Maury-McAfee

Deep and moderately deep, well drained soils that have a clayey subsoil; on gently sloping to strongly sloping ridges, shoulder slopes, and hillsides

This map unit consists of gently sloping ridges and slightly dissected, sloping shoulder slopes and strongly sloping hillsides (fig. 12). A karst topography is in some places. This unit is in the southeastern part of Franklin County.

This map unit makes up about 11 percent of Franklin County. It is about 51 percent Maury soils, 21 percent McAfee soils, and 28 percent soils of minor extent.

The Maury soils are on gently sloping ridgetops and sloping shoulder slopes. These deep, well drained soils have a loamy surface layer and a clayey subsoil. The McAfee soils are mostly on sloping shoulder slopes and are below the Maury soils. They also extend from gently sloping ridgetops to the strongly sloping hillsides. These moderately deep, well drained soils have a loamy surface layer and a clayey subsoil. Maury and McAfee soils are underlain by limestone.

Of minor extent are the Lowell and Faywood soils on uplands. Huntington soils are on the flood plains of Elkhorn Creek, and Ashton soils are on stream terraces.

Most of the acreage is used for pasture, hay, and cultivated crops. Beef cattle and burley tobacco farms are the main enterprises. A few dairy and horse farms are in this unit. Some areas around Frankfort are used for urban development.

The gently sloping ridgetops and sloping shoulder slopes are well suited to cultivated crops, but the hazard of erosion is moderate to severe. The strongly sloping hillsides are poorly suited to cultivated crops.

The soils are well suited to pasture and hay. The strongly sloping hillsides are best suited to permanent pasture, hay, or woodland. The soils have moderately high productivity for trees.

The gently sloping and sloping soils are suited to urban development, but clayey texture and depth to bedrock are limitations in places. The steeper soils are poorly suited to urban development.

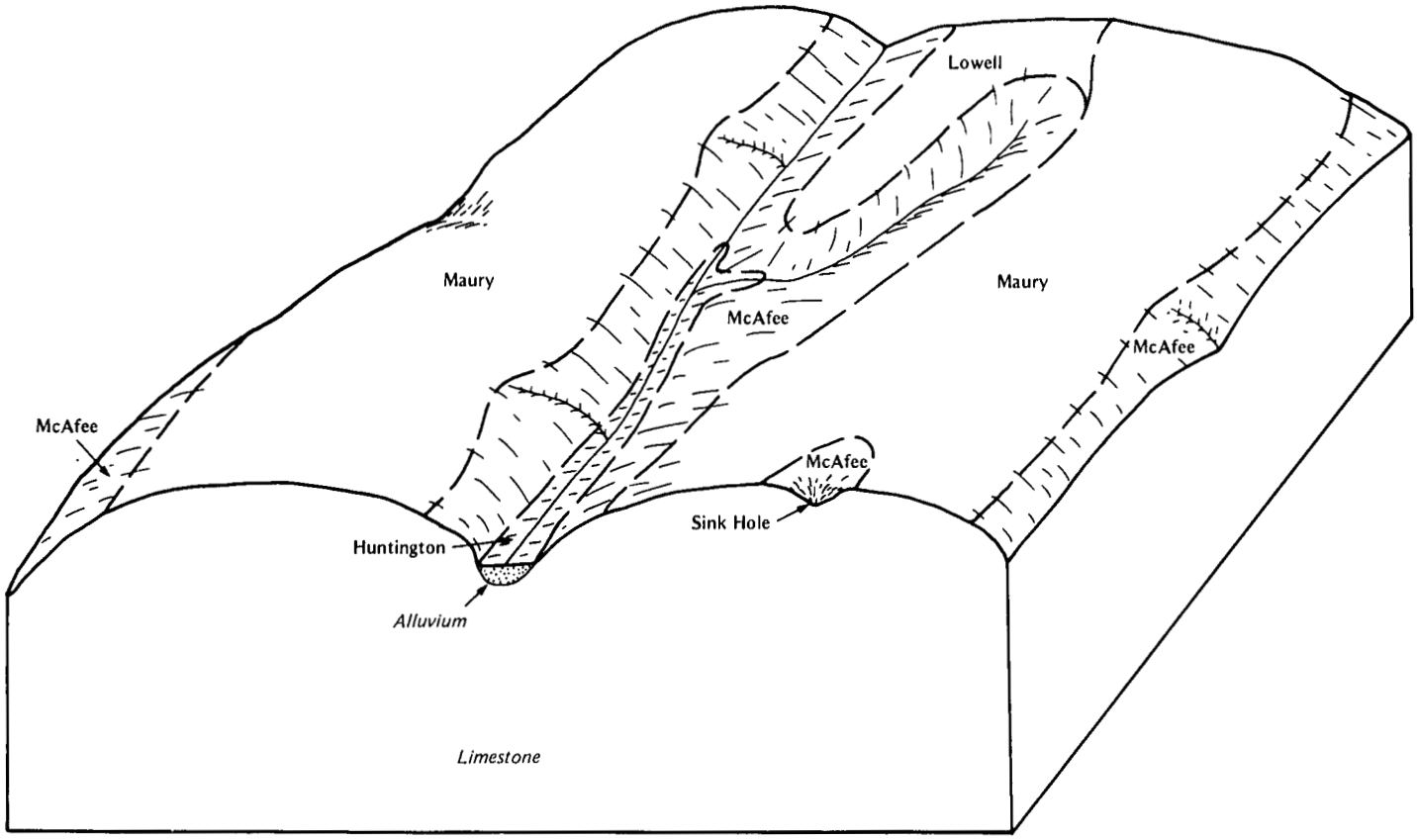


Figure 12.—Relationship of soils to topography and underlying material in the Maury-McAfee unit.

7. Fairmount-Rock outcrop-McAfee

Shallow and moderately deep, well drained soils that have a clayey subsoil and Rock outcrop; on strongly sloping to very steep hillsides and bluffs and on sloping ridgetops

This map unit consists of a highly dissected area on hillsides, bluffs, and ridgetops. The ridgetops are sloping. The upper part of the hillsides is strongly sloping, and the lower part of the hillsides and the bluffs are moderately steep to very steep. This area is in south-central Franklin County.

This map unit makes up about 2 percent of Franklin County. It is about 37 percent Fairmount soils, 16 percent Rock outcrop, 16 percent McAfee soils, and 31 percent soils of minor extent.

The Fairmount soils are on the steep and very steep bluffs above the Kentucky river and on moderately steep hillsides above the smaller streams. These soils are shallow and well drained. Typically, they have a clayey surface layer and a clayey subsoil. Limestone fragments are throughout. The Fairmount soils are underlain by limestone interbedded with thin layers of calcareous shale and siltstone. Rock outcrop occurs in areas of Fairmount soils and of strongly sloping McAfee soils. Outcrops are most prominent and numerous on the steeper bluffs. The McAfee soils are on the sloping ridgetops and strongly sloping hillsides. They are above the Fairmount soils. The moderately deep McAfee soils are well drained. Typically, they have a loamy surface layer and a clayey subsoil. They are underlain by limestone.

Of minor extent are Faywood, Lowell, and Elk soils on uplands. The Faywood and Lowell soils formed in clayey residuum weathered from limestone interbedded with thin layers of shale and siltstone. The Elk soils formed in old alluvial deposits. Some small areas of Nolin and Newark soils are on narrow flood plains.

Most of the acreage is woodland. Some of the acreage is in pasture. A few areas of the minor soils are cropped to burley tobacco and hay.

Most of the soils have low to moderately high productivity for trees. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

Most of the soils are poorly suited to crops, pasture, and urban uses because of steep slopes, shallowness to bedrock, and rock outcrop.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, McAfee silt loam, 2 to 6 percent slopes, is one of several phases in the McAfee series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Fairmount-Rock outcrop complex, 30 to 60 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AsA—Ashton silt loam, rarely flooded, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on stream terraces. Individual areas are mostly along Elkhorn Creek in Franklin County. They are long and narrow, between 200 to 400 feet wide, and from about 5 to 25 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 17 inches, is brown silt loam. The lower part of the subsoil and the underlying material to a depth of about 68 inches is brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from neutral to medium acid throughout. Permeability is moderate, and the available water capacity is high. Tilth is good, and the soil can be worked through a wide range of moisture content. The root zone is deep. Runoff is slow to medium. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Huntington and Elk soils.

Most of this soil is used for cultivated crops, hay, and pasture. A few small areas are used for home sites and subdivisions.

This soil is well suited to all the cultivated crops commonly grown in the area. The crops respond well to lime and fertilizer. Erosion is a slight hazard. This soil can be cropped intensively if properly managed. Conservation tillage, return of crop residue to the soil, and a cover crop help to maintain desirable soil structure and organic matter content. In places diversions are used to intercept runoff from higher, adjacent soils.

This soil is well suited to most pasture and hay crops commonly grown in the area. If properly managed, this soil produces high yields. The desired species can be maintained by renovation. Application of lime and

fertilizer, proper stocking rates, and weed control are needed.

This soil has very high productivity for trees. The preferred species for planting are eastern white pine, yellow-poplar, black walnut, sweetgum, eastern cottonwood, cherrybark and pin oaks, white ash, and American sycamore. Plant competition is a management concern.

This soil is suited to some urban uses, but rare flooding is a limitation.

This Ashton soil is in capability class I and woodland suitability group 1o.

AsB—Ashton silt loam, rarely flooded, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on stream terraces. Individual areas are mostly along Elkhorn Creek in Franklin County. They are long and narrow, between 150 and 300 feet wide, and about 5 to 30 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 17 inches, is brown silt loam. The lower part of the subsoil and the underlying material to a depth of about 68 inches is brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from neutral to medium acid throughout. Permeability is moderate, and the available water capacity is high. Tilth is good, and the soil can be worked through a wide range of moisture content. The root zone is deep. Runoff is slow to medium. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Huntington and Elk soils. Also included are some areas of soils that are not subject to flooding.

Most of this soil is used for cultivated crops, hay, and pasture. A few small areas are used for home sites and subdivisions.

This soil is well suited to all the cultivated crops commonly grown in the area. The crops respond well to lime and fertilizer. Erosion is a moderate hazard. Some measures to control erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, a cover crop, and the inclusion of grasses and legumes in the cropping system help control erosion and maintain desirable soil structure and organic matter content. In places diversions are used to intercept runoff from higher, adjacent soils.

This soil is well suited to all pasture and hay crops commonly grown in the area. If properly managed, this soil produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has very high productivity for trees. The preferred species for planting are eastern white pine, yellow-poplar, black walnut, sweetgum, eastern cottonwood, cherrybark and pin oaks, white ash, and American sycamore. Plant competition is a management concern.

This soil is suited to some urban uses, but rare flooding is a limitation.

This Ashton soil is in capability subclass IIe and woodland group 1o.

Bo—Boonesboro silt loam, occasionally flooded. This moderately deep, well drained, nearly level soil is on flood plains along narrow valleys of small streams. Individual areas are usually long, narrow bands 150 to 300 feet wide, and range from about 5 to 60 acres.

Typically, the surface layer is dark brown silt loam about 18 inches thick. The subsoil, to a depth of about 28 inches, is brown gravelly loam. Limestone bedrock is at a depth of 28 inches.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from slightly acid to mildly alkaline throughout. Permeability is moderate in the surface and rapid in the subsoil. Available water capacity is moderate. Tilth is good, and this soil can be worked through a wide range of moisture content. The root zone is moderately deep. Runoff is medium. This soil is subject to occasional flooding for brief periods, usually late in winter and early in spring.

Included with this soil in mapping are small areas of Huntington, Lindside, and Nolin soils. Also included are small areas of soils that have a gravelly surface layer.

This Boonesboro soil is used mostly for cultivated crops, hay, and pasture.

This soil is suited to cultivated crops. If properly managed, it produces high yields in most seasons. During dry seasons, the available water capacity of this soil limits production. Conservation tillage, return of crop residue to the soil, a cover crop, and proper fertilization help maintain desirable soil structure and organic matter content. Cover crops of small grain are sometimes damaged by winter flooding.

This soil is well suited to pasture and hay, although some hay crops may be damaged by flooding. Desired species can be maintained by frequent renovation, proper stocking rates, application of fertilizer, and weed control.

This soil has very high productivity for trees. The preferred species for planting are eastern cottonwood, sweetgum, northern red oak, yellow-poplar, white ash, and American sycamore. Plant competition is a management concern.

This soil is poorly suited to most urban development because of occasional flooding and moderate depth to bedrock.

This Boonesboro soil is in capability subclass IIs and woodland group 1o.

Du—Dunning silty clay loam, occasionally flooded. This deep, very poorly drained to poorly drained, nearly level soil is on flood plains. Individual areas usually are in

long, narrow bands 200 to 300 feet wide and vary from about 3 to 15 acres.

Typically, the surface layer is about 15 inches thick. It is very dark gray silty clay loam in the upper part and black silty clay loam that has common, dark reddish brown mottles in the lower part. The subsoil, from 15 to 36 inches, is dark gray silty clay that has common, pale olive and dark olive gray mottles. The underlying material to a depth of about 63 inches is dark gray silty clay that has common, strong brown mottles.

This soil is high in natural fertility and organic matter content. Reaction ranges from medium acid to mildly alkaline throughout. Permeability is slow, and the available water capacity is high. Runoff is slow. Tillage is somewhat difficult because of the high clay content of the surface layer. A seasonal high water table is at or near the surface. This soil is subject to occasional flooding for brief periods, usually late in winter and early in spring. It has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Melvin and Newark soils. Also included are areas of soils that are subject to ponding after heavy rains.

Most of this soil is used for cultivated crops, hay, and pasture.

A seasonal high water table is the major limitation of this soil for growing cultivated crops. Planting and harvesting are sometimes delayed by wetness. When properly drained, this soil produces high yields of corn and soybeans. Open ditch drainage, in combination with grassed waterways, is commonly used to help correct wetness. Conservation tillage, return of crop residue to the soil, and a cover crop help maintain desirable soil structure and organic matter content. Cover crops of small grain are sometimes damaged by winter flooding.

This soil is suited to pasture and hay crops that tolerate wetness. Some crops may be damaged by flooding. The desired species can be maintained by renovation. Application of fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil has very high productivity for trees. The preferred species for planting are pin oak, baldcypress, swamp white oak, and American sycamore. Plant competition, seedling mortality and equipment limitations are management concerns.

This soil is poorly suited to most urban development because of flooding, wetness, and moderate shrink-swell potential.

This Dunning soil is in capability subclass IIIw and woodland group 1w.

EdC—Eden silty clay loam, 6 to 15 percent slopes. This moderately deep, well drained, sloping to strongly sloping soil is on narrow ridgetops and hillsides. The slopes range from 75 to 300 feet in length. Individual areas range from 5 acres to several hundred acres.

Typically, the surface layer is dark grayish brown silty clay loam about 5 inches thick. The subsoil, to a depth of about 23 inches, is light olive brown flaggy silty clay. The underlying material to a depth of about 67 inches is slightly weathered olive and light olive gray interbedded shale, siltstone, and thin layers of fractured limestone.

This soil is medium in natural fertility and low in organic matter content. Reaction ranges from strongly acid to mildly alkaline in the surface layer and subsoil and mildly alkaline or strongly alkaline in the underlying material. Permeability is slow, and available water capacity is moderate. The silty clay loam surface layer is somewhat difficult to till. The root zone is moderately deep. The shrink-swell potential is moderate.

Included with this soil in mapping are small areas of Faywood, Fairmount, and Lowell soils. Also included are a few areas of severely eroded soils, some areas of soils that have more than 15 percent slopes, and a soil similar to this Eden soil but which is more than 40 inches to bedrock.

Most of this soil is used for pasture, but a few areas are planted to tobacco. Some areas are idle and are being revegetated naturally by eastern redcedar.

The steep slopes and hazard of erosion limit the use of this soil for cultivated crops. Returning crop residue to the soil, conservation tillage, and drought resistant plants in the cropping system are practices that help control erosion when row crops are grown.

This soil is suited to pasture and hay but requires good management to prevent erosion. Selecting plants that provide adequate ground cover is important. Forage production during midsummer is relatively low on this soil. Stocking rates should be adjusted to prevent overgrazing. The application of lime and fertilizer, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. Preferred species for planting are black and white oaks and white ash. Plant competition, seedling mortality, and equipment limitations are management concerns. Some included soils are deeper to bedrock and produce higher yields of hardwood trees than is normal for this soil.

This soil is poorly suited to most urban development. Depth to bedrock, slope, slow permeability, and clayey texture are limitations for sanitary facilities. Shrink-swell, clayey texture, and depth to bedrock are limitations for building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Eden soil is in capability subclass IIIe and woodland group 3c.

EfE—Eden flaggy silty clay, 15 to 35 percent slopes. This moderately deep, well drained, strongly sloping to steep soil is on hillsides. The slopes, dissected by small drainageways, range from 100 to 600 feet in length. Individual areas range from about 10 acres to several hundred acres. Limestone flagstones and weathered fragments of siltstone and shale cover about 15 to 20 percent of the surface.

Typically, the surface layer is dark grayish brown flaggy silty clay about 5 inches thick. The subsoil, to a depth of about 23 inches, is light olive brown flaggy silty clay. The underlying material to a depth of about 67 inches is slightly weathered olive and light olive gray, interbedded shale and siltstone and thin layers of fractured limestone.

This soil is medium in natural fertility and low in organic matter content. Reaction ranges from strongly acid to mildly alkaline in the surface layer and subsoil and mildly alkaline or strongly alkaline in the underlying material. Permeability is slow, and available water capacity is moderate. Because of the silty clay surface layer and flagstones, this soil is difficult to till. The root zone is moderately deep. The shrink-swell potential is moderate.

Included with this soil in mapping are small areas of Faywood and Fairmount soils on hillsides and Boonesboro soils on the narrow flood plains. A few areas of severely eroded soils and some areas of soils where slopes are more than 35 percent are included. Also included is a soil similar to the Eden soil but which is more than 40 inches to bedrock.

Most of this soil is in woodland or brush. Some areas are in pasture. Some areas are idle and are being revegetated naturally by eastern redcedar. This soil is poorly suited for cultivated crops because of a steep slope, a very severe hazard of erosion, and flagstones on the surface.

This soil is suited to pasture, but requires good management to prevent erosion. Selecting plants that provide adequate ground cover and require infrequent renovation is important. Forage production during midsummer is low on this soil. Stocking rates should be adjusted to prevent overgrazing. The application of lime and fertilizer, brush control, and rotational grazing are needed. The steep slopes and flagstones are limitations for the use of farm machinery on this soil.

This soil has moderate or moderately high productivity for trees. Preferred species for planting are white and black oaks, Virginia pine, and white ash. The hazard of erosion, seedling mortality, plant competition, and equipment limitations are management concerns. Some included soils, particularly the Boonesboro soils on narrow flood plains and the deeper soils on foot slopes and bench positions, produce higher quality hardwood trees than is normal for this soil.

This soil is poorly suited to urban development because of steep slopes, the clayey subsoil, slow permeability, and moderate depth to bedrock. Some included soils are suited to urban uses, but those on the narrow flood plains are subject to occasional flooding and are poorly suited to use as homesites.

This Eden soil is in capability subclass VIe. It is in woodland group 3c on the north aspect and 4c on the south aspect.

EkB—Elk silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on intermediate stream terraces and on old alluvial deposits on uplands. Individual areas are irregularly shaped and vary from about 3 to 50 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, at a depth of 8 to 15 inches, is yellowish brown silt loam. The lower part of the subsoil, at a depth of 15 to 46 inches, is brown silty clay loam. The underlying material at a depth of 46 to 62 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate, and available water capacity is high. Except where the soil is limed, reaction ranges from medium acid to very strongly acid throughout. Tilth is good, and the soil can be worked through a wide range of moisture content. Runoff is medium. The root zone is deep.

Included with this soil in mapping are small areas of soils that contain varying amounts of sand and gravel. Also included are small areas of Otwell soils and some low areas of soils subject to rare flooding.

This soil is used mostly for cultivated crops, hay, and pasture. Some areas are in urban development.

This soil is well suited to all the cultivated crops commonly grown in the area, including burley tobacco, corn, and soybeans. Very high yields can be obtained if the soil is properly managed. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard when cultivated crops are grown. Conservation tillage, the use of cover crops, and grasses and legumes in a cropping system are practices that help reduce runoff and control erosion.

This soil is well suited to all of the pasture and hay crops commonly grown in the area (fig. 13). When properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are eastern white and shortleaf pines; yellow-poplar; black walnut; black, white, and northern red oaks; eastern cottonwood; white ash; American sycamore; and sweetgum. Plant competition is a management concern.

This soil is well suited to most urban development. A few low areas of included soils are subject to rare flooding. This soil is limited by low strength for local roads and streets and for use as roadfill.

This Elk soil is in capability subclass IIe and woodland group 2o.

EkC—Elk silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on intermediate stream terraces and old alluvial deposits on uplands. Individual areas are irregularly shaped and vary from about 3 to 70 acres.

Figure 13.—Dairy cows grazing on grass-legume pasture in an area of Elk silt loam, 2 to 6 percent slopes.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, at a depth of 8 to 15 inches, is yellowish brown silt loam. The lower part of the subsoil, at a depth of 15 to 46 inches, is brown silty clay loam. The underlying material at a depth of 46 to 62 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate and available water capacity is high. Except where the soil is limed, reaction ranges from medium acid to very strongly acid throughout. Tilth is good, and the soil can be worked through a wide range of moisture content. The root zone is deep.

Included with this soil in mapping are small areas of soils that contain varying amounts of sand and gravel. Also included are small areas of Otwell soils, some areas of soils subject to rare flooding, and, on higher positions in the landscape, a few areas of soils that are underlain by limestone bedrock at a depth of 40 to 60 inches.

This soil is being used mostly for cultivated crops, hay, and pasture. Some areas are in urban development.

This soil is suited to all the cultivated crops commonly grown in the area, including burley tobacco and corn. High yields can be obtained if the soil is properly managed. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard when cultivated crops are grown. Conservation tillage, the use of cover crops, and grasses and legumes in a cropping system are practices that help reduce runoff and control erosion.

This soil is well suited to all of the pasture and hay crops commonly grown in the area. If properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are eastern white and shortleaf pines; yellow-poplar; black walnut; black, white, and

northern red oaks; eastern cottonwood; white ash; American sycamore; and sweetgum. Plant competition is a management concern.

This soil is suited to most urban development. Slope is a limitation for sanitary facilities and building site development. The soil is limited by low strength for local roads and streets and for use as roadfill. The few areas of included soils that are subject to rare flooding are poorly suited to urban development.

This Elk soil is in capability subclass IIIe and woodland group 2o.

EkD—Elk silt loam, 12 to 20 percent slopes. This deep, well drained, strongly sloping soil is on intermediate stream terraces, mostly along the Kentucky River. Individual areas are irregularly shaped and vary from about 3 to 20 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, at a depth of 8 to 15 inches, is yellowish brown silt loam. The lower part of the subsoil, at a depth of 15 to 46 inches, is brown silty clay loam. The underlying material at a depth of 46 to 62 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate, and available water capacity is high. Except where the soil is limed, reaction ranges from medium acid to very strongly acid throughout. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep.

Included with this soil in mapping are small areas of soils that contain varying amounts of sand and gravel. Also included are small areas of Otwell and McAfee soils and some low areas of included soils subject to rare flooding.

This soil is used mostly for hay and pasture. Some areas are in cultivated crops. A few areas are in urban development.

This soil is poorly suited to cultivated crops because of steep slope. Under cultivation, this soil produces moderate yields if properly managed. Erosion is a very severe hazard when cultivated crops are grown. Good tilth is maintained by returning crop residue to the soil. Conservation tillage, the use of cover crops, and grasses and legumes in a cropping system are practices that help reduce runoff and control erosion.

This soil is suited to all pasture and hay crops commonly grown in the area. When properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are eastern white and shortleaf pines; yellow-poplar; black walnut; black, white, and northern red oaks; eastern cottonwood; white ash; American sycamore; and sweetgum. Plant competition, the hazard of erosion, and equipment limitations are management concerns.

This soil is poorly suited to most urban development. Steep slope is a limitation for sanitary facilities and for building site development. The soil is limited by low strength for local roads and streets and for use as roadfill. A few low areas of included soils are subject to rare flooding.

This Elk soil is in capability subclass IVe and woodland group 2r.

ElB—Elk silt loam, rarely flooded, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on low stream terraces. Individual areas are irregularly shaped and vary from about 3 to 50 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, at a depth of 8 to 15 inches, is yellowish brown silt loam. The lower part of the subsoil, at a depth of 15 to 46 inches, is brown and strong brown silty clay loam. The underlying material from a depth of 46 to 62 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate, and available water capacity is high. Except where the soil has been limed, reaction ranges from medium acid to very strongly acid throughout. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep. Runoff is medium. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of soils that contain varying amounts of sand and gravel. Also included are small areas of Ashton and Otwell soils. Some small areas are not subject to flooding.

This soil is used mostly for cultivated crops, hay, and pasture. Some areas are in urban development.

This soil is well suited to all the cultivated crops commonly grown in the area. Crops respond well to lime and fertilizer. Erosion is a moderate hazard. Some measures to control erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, use of cover crops, and grasses and legumes in the cropping system help control erosion and maintain desirable soil structure and organic matter content.

This soil is well suited to all pasture and hay crops commonly grown in the area. If properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are eastern white and shortleaf pines; yellow-poplar; black walnut; black, white, and northern red oaks; eastern cottonwood; white ash; American sycamore; and sweetgum. Plant competition is a management concern.

This soil is suited to some urban development, but flooding is a limitation. It is limited by low strength for local roads and streets and for use as roadfill. A few areas of soils not subject to flooding are suited to most urban uses.

This Elk soil is in capability subclass IIe and woodland group 2o.

ElC—Elk silt loam, rarely flooded, 6 to 12 percent slopes. This deep, well drained, sloping soil is on low stream terraces. Individual areas are irregularly shaped and vary from about 3 to 70 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, at a depth of 8 to 15 inches, is yellowish brown silt loam. The lower part of the subsoil, at a depth of 15 to 46 inches, is brown silty clay loam. The underlying material at a depth of 46 to 62 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate, and available water capacity is high. Except where the soil is limed, reaction ranges from medium acid to very strongly acid throughout. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of soils that contain varying amounts of sand and gravel. Also included are small areas of Ashton and Otwell soils. Some small areas of soils are not subject to flooding.

This soil is being used for cultivated crops, hay, and pasture. Some areas are in urban development.

This soil is suited to all cultivated crops commonly grown in the area. Erosion is a severe hazard if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, use of cover crops, and grasses and legumes in the cropping system help control erosion and maintain desirable soil structure and organic matter content.

This soil is well suited to all pasture and hay crops commonly grown in the area. If properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are eastern white and shortleaf pines; yellow-poplar; black walnut; black, white, and northern red oaks; eastern cottonwood; white ash; American sycamore; and sweetgum. Plant competition is a management concern.

This soil is suited to some urban development, but flooding and slope are limitations. It is limited by low strength for local roads and streets and for use as roadfill. A few areas of soils are not subject to flooding and are suited to most urban uses.

This Elk soil is in capability subclass IIIe and woodland group 2o.

FaC—Fairmount flaggy silty clay, 6 to 12 percent slopes. This shallow, well drained, sloping soil is on narrow ridgetops and hillsides. Individual areas are irregular in shape and range from about 5 acres to about 50 acres. Limestone flagstones cover about 15 to 30 percent of the surface.

Typically, the surface layer is very dark grayish brown flaggy silty clay about 10 inches thick. The subsoil, at a depth of 10 to 16 inches, is brown flaggy clay. Bedrock is at a depth of 16 inches.

This soil has medium natural fertility and high organic matter content. It is neutral to moderately alkaline throughout. Permeability is moderately slow or slow, and the available water capacity is low. Tillage is very difficult because of the high clay content and flagstones in the surface layer. The root zone is shallow. Shrink-swell potential is moderate.

Included with this soil in mapping are a few areas of Faywood soils and small areas of a soil which is similar to this Fairmount soil but which has a lighter colored surface layer. Also included are a few areas of soils that have less than 6 percent slopes and small areas of severely eroded soils.

Most of this soil is used for pasture, but some areas are in brush.

This soil is poorly suited to cultivated crops because of a severe hazard of erosion, flagstones, shallow depth, and clayey texture.

This soil is poorly suited to pasture and hay. With adequate rainfall and good management, however, moderate yields can be obtained. Selecting drought resistant plants that require infrequent renovation is important. Application of fertilizer, proper stocking rates, and rotational grazing help maintain adequate ground cover and control erosion. Flagstones on the surface limit the use of farm machinery in seeding or harvesting hay.

This soil has low productivity for trees. Preferred species for planting are eastern white and Virginia pines and black and white oaks. Seedling mortality and equipment limitations are management concerns.

This soil is poorly suited to most urban development. Depth to bedrock and moderately slow to slow permeability are limitations for sanitary facilities and building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Fairmount soil is in capability subclass VIe and woodland group 5d.

FcE—Fairmount-Rock outcrop complex, 12 to 30 percent slopes. This map unit is made up of shallow, well drained, strongly sloping and moderately steep soils and Rock outcrop on hillsides. Fairmount soils and Rock

outcrop were mapped together because they are so intermingled separation was impractical. Generally, the Fairmount soils are throughout the complex. Dominantly, they have slopes of 12 to 20 percent. Slopes range from about 150 to 300 feet in length. Rock crops out primarily on the steeper slopes. Individual areas vary from about 10 to 400 acres.

The Fairmount soils make up about 70 percent of the complex. Typically, the surface layer is very dark grayish brown flaggy silty clay about 10 inches thick. The subsoil, at a depth of 10 to 16 inches, is brown flaggy clay. Hard limestone bedrock is at a depth of 16 inches.

The Fairmount soil is medium in natural fertility and high in organic matter content. Reaction ranges from neutral to moderately alkaline throughout. Permeability is moderately slow to slow, and the available water capacity is low. Tillage is very difficult because of steep slope and rock outcrop. The root zone is shallow. The shrink-swell potential is moderate.

Rock outcrop makes up about 25 percent of the complex. Typically, it is exposed limestone bedrock. Although rock crops out throughout the unit, it is most common on the steeper slopes, where it is about 100 to 200 feet thick.

Included with this complex in mapping are small areas of Faywood soils and a deep soil which has a dark surface layer and is on narrow benches. A few areas of severely eroded soils are included.

Most of this complex is in woodland. A few areas have been cleared, but much of the acreage is overgrown with brush and is reverting back to woodland.

This complex is poorly suited to cultivated crops, pasture, and hay because of the steep slope and rock outcrop. It has limited suitability for wildlife. A ground cover of drought resistant plants helps reduce runoff and control erosion.

This complex has low productivity for trees. Preferred species for planting are eastern white and Virginia pines and black and white oaks. The hazard of erosion, equipment limitations, and seedling mortality are management concerns.

The complex is poorly suited to urban development. The steep slope, moderately slow to slow permeability, and rock outcrop are limitations for sanitary facilities and building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This complex is in capability subclass VIs and woodland group 5d.

FcF—Fairmount-Rock outcrop complex, 30 to 60 percent slopes. This map unit is made up of shallow, well drained steep and very steep soils and rock outcrop on hillsides and bluffs, particularly along the Kentucky River. Fairmount soils and Rock outcrop were mapped together because they are so intermingled separation was impractical. Generally, the Fairmount soils are throughout the complex. Dominantly, they have slopes of 30 to 40 percent. Slopes range from about 200 to 500 feet in length. Rock outcrop is primarily on the steeper bluffs. Individual areas vary from about 15 to 500 acres.

The Fairmount soil makes up about 60 percent of the complex. Typically, the surface layer is very dark grayish brown flaggy silty clay about 10 inches thick. The subsoil, at a depth of 10 to 16 inches, is brown flaggy clay. Hard limestone bedrock is at a depth of 16 inches.

This soil is medium in natural fertility and high in organic matter content. Reaction ranges from neutral to moderately alkaline throughout. Permeability is moderately slow or slow, and the available water capacity is low. Tillage is very difficult because of the steep slope, rock outcrop, and flagstones. The root zone is shallow. The shrink-swell potential is moderate.

Rock outcrop makes up about 35 percent of the complex. Typically, it is exposed limestone bedrock scattered throughout the unit. Rock outcrop is more common along the very steep bluffs where it is about 100 to 200 feet thick (fig. 14). These outcrops generally parallel the slope. In some areas boulders are on the surface.

Included with this complex in mapping are small areas of Faywood soils and a deep soil which has a dark surface layer and is on narrow benches. Also included are a few areas of severely eroded soils.

Most of this complex is in woodland.

This complex is poorly suited to cultivated crops, pasture, and hay because of steep slope and rock outcrop. Suitability for wildlife is limited. A ground cover of drought resistant plants helps reduce runoff and control erosion.

This complex has low productivity for trees. Preferred species for planting are eastern white and Virginia pines, and black and white oaks. Hazard of erosion, equipment limitations, and seedling mortality are management concerns.

This complex is poorly suited to urban development. Steep slope, moderately slow to slow permeability, and rock outcrop are limitations for sanitary facilities and building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This complex is in capability subclass VIIs and woodland group 5d.

FdC—Faywood silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping soil is on ridgetops, shoulder slopes, and hillsides. Individual areas are irregular in shape and vary from about 3 to 250 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The upper part of the subsoil, to a depth of about 21 inches, is yellowish brown silty clay. The lower subsoil, to a depth of about 34 inches, is yellowish

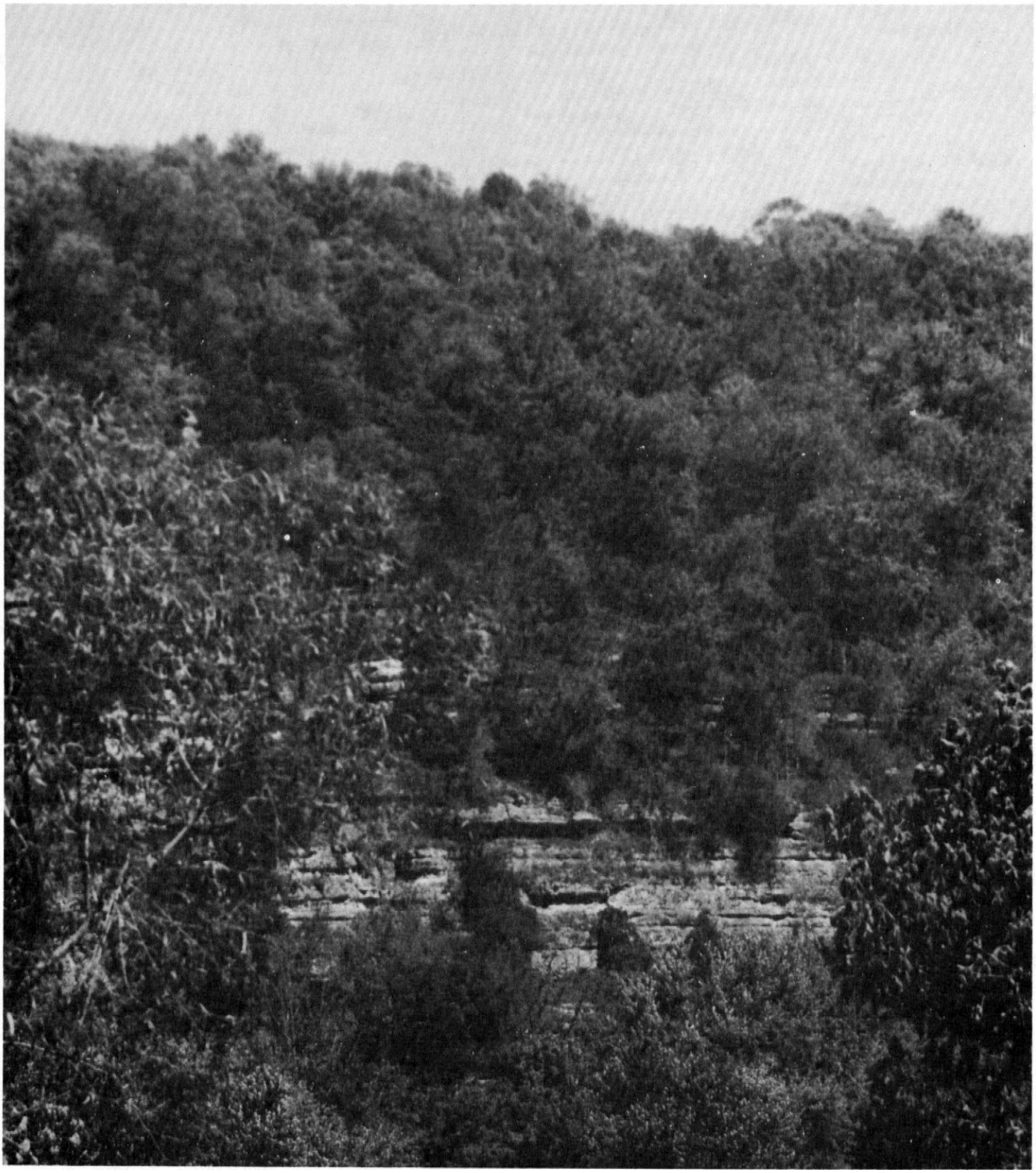


Figure 14.—Rock outcrop along bluffs in an area of Fairmount-Rock outcrop complex, 30 to 60 percent slopes.

Figure 15.—Rural housing development in an area of Faywood silt loam, 6 to 12 percent slopes. In the foreground, limestone bedrock is exposed at a depth of about 30 inches.

brown clay. Limestone bedrock is at a depth of 34 inches.

This soil is medium in natural fertility and moderate in organic matter content. Reaction ranges from neutral to strongly acid. The lower few inches above bedrock, however, may be mildly alkaline. Permeability is moderately slow or slow, and the available water capacity is moderate. Tilth is good, and the soil can be worked over a wide range of moisture content. The root zone is moderately deep. The subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Lowell, McAfee, Eden, and Fairmount soils.

Most of this soil is being used for pasture, hay, or cultivated crops. A small acreage is being used for homesites (fig. 15).

This soil is suited to cultivated crops. Erosion is a severe hazard when cultivated crops are grown. Conservation tillage, a cover crop, and grasses and legumes in a cropping system help reduce runoff and control erosion.

This soil is suited to most of the hay and pasture crops commonly grown in the area. Moderate yields can be attained by using good management practices. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. Preferred species for planting are black and white oaks, white ash, and eastern white pine. Equipment limitations and plant competition are management concerns.

This soil is poorly suited to most urban development. Depth to bedrock, and moderately slow or slow permeability are limitations for sanitary facilities and for building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Faywood soil is in capability subclass IIIe and woodland group 3c.

FdD—Faywood silt loam, 12 to 30 percent slopes. This moderately deep, well drained, moderately steep to steep soil is on hillsides. Individual areas are irregular in shape and vary from about 5 to 150 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The upper part of the subsoil, to a depth of about 21 inches, is yellowish brown silty clay. The lower part, to a depth of about 34 inches, is yellowish brown clay. Limestone bedrock is at a depth of 34 inches.

This soil is medium in natural fertility and moderate in organic matter content. Reaction ranges from neutral to strongly acid. The lower few inches above bedrock, however, may be mildly alkaline. Permeability is moderately slow or slow, and the available water capacity is moderate. Tilth is good, and the soil can be worked over a wide range of moisture content. The root zone is moderately deep. The subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of McAfee, Fairmount, and Eden soils.

Most of this soil is being used for pasture. A small acreage where the soil has 12 to 20 percent slopes is used for hay and cultivated crops. Some areas of steeper soils are in woods or brush.

This soil is poorly suited to cultivated crops. Erosion is a very severe hazard when cultivated crops are grown. Conservation tillage, a cover crop, and grasses and legumes in the cropping system help reduce runoff and control erosion.

This soil is suited to most of the hay and pasture crops commonly grown in the area. Moderate yields can be attained by good management practices. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees (fig. 16). Preferred species for planting are black and white oaks, white ash, and eastern white pine. Equipment limitations, erosion hazard, and plant competition are management concerns.

This soil is poorly suited to most urban development. Slope, depth to bedrock, and slow or moderately slow permeability are limitations for sanitary facilities and for building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Faywood soil is in capability subclass VIe and woodland group 3c.

FeC3—Faywood silty clay, 6 to 12 percent slopes, severely eroded. This sloping soil is moderately deep, well drained, and severely eroded. It is on ridgetops, shoulder slopes, and hillsides. Individual areas are irregular in shape and vary from about 3 to 30 acres.

Typically, the surface layer is yellowish brown silty clay about 5 inches thick. The upper part of the subsoil, to a depth of about 16 inches, is also yellowish brown silty clay. The lower part, to a depth of about 29 inches, is yellowish brown clay. Limestone bedrock is at a depth of 29 inches.

The soil is medium in natural fertility and low in organic matter content. Reaction ranges from neutral to strongly acid. The lower few inches above bedrock, however, may be neutral. Permeability is moderately slow or slow, and the available water capacity is low. The root zone is moderately deep. Tillage is difficult because of the silty clay surface layer. The subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Lowell, McAfee, Eden, and Fairmount soils.

Most of this soil is being used for hay and pasture. A few acres are idle and have reverted to brush.

This soil is poorly suited to cultivated crops. Erosion is a very severe hazard when cultivated crops are grown. Conservation tillage, a cover crop, and grasses and legumes in the cropping system help reduce runoff and control further erosion.

This soil is suited to hay and pasture. Moderate yields can be attained by using good management practices. The moderate depth to bedrock limits production of deep rooted legumes. Vegetation is somewhat difficult to establish since erosion has removed most of the original surface layer. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderate productivity for trees. Preferred species for planting are black and white oaks, Virginia pine, and eastern redcedar. Equipment limitations and seedling mortality are management concerns.

This soil is poorly suited to most urban development. Depth to bedrock and moderately slow or slow permeability are limitations for sanitary facilities and building site development. This soil is limited by low strength for local roads and streets and for use as roadfill.

This Faywood soil is in capability subclass IVe and woodland group 4c.

Hu—Huntington silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains along Elkhorn Creek and its tributaries. Individual areas usually are in long, fairly narrow bands 150 to 400 feet wide. They are about 10 to 80 acres.

Typically, the surface layer is very dark brown silt loam about 10 inches thick. The subsoil extends to a depth of 58 inches. It is dark grayish brown silt loam in the upper part and brown silty clay loam in the lower part. The underlying material to a depth of 68 inches is brown sandy clay loam.

Figure 16.—Hardwood forest in an area of Faywood silt loam, 12 to 30 percent slopes.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from medium acid to mildly alkaline throughout. Permeability is moderate, and the available water capacity is high. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep. Runoff is medium. This soil is subject to brief periods of occasional flooding, usually late in winter and early in spring.

Included with this soil in mapping are small areas of Lindside, Boonesboro, and Ashton soils and a few small areas of soils that have a silty clay subsoil.

This soil is used for cultivated crops, hay, and pasture.

This soil is well suited to most of the cultivated crops commonly grown in the area. Very high yields can be attained by using good management. Conservation tillage, return of crop residue to the soil, and a cover crop help to maintain soil structure and organic matter content. A cover crop of small grain is sometimes damaged by winter flooding. In places, diversions on higher adjacent areas protect the flood plains from runoff.

This soil is well suited to all of the pasture and hay crops commonly grown in the area. Some hay crops may be damaged by flooding. If the soil is properly managed, high yields can be attained. The desired species can be maintained by renovation. Application of fertilizer, proper stocking rates, and weed control are needed.

This soil has very high productivity for trees. The preferred species for planting are eastern white and shortleaf pines, yellow-poplar, black walnut, white ash, northern red oak, and American sycamore.

Flooding is a limitation of this soil for urban development.

This Huntington soil is in capability subclass IIw and woodland group 1o.

Lc—Lawrence silt loam, rarely flooded. This deep, somewhat poorly drained, nearly level soil is primarily on stream terraces. Individual areas are irregularly shaped and vary from about 2 to 30 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, at a depth of 7 to 24 inches, is brown and yellowish brown silt loam and silty clay loam mottled in shades of brown and gray. A very firm, compact and brittle fragipan of silty clay loam is at a depth of 24 to 50 inches. It is mottled with yellowish brown, strong brown, and light brownish gray. The lower part of the subsoil, at a depth of 50 to 62 inches, is brown silty clay loam that has light brownish gray mottles. The underlying material, from 62 to 75 inches, is mottled light brownish gray and strong brown and brown fine sandy loam.

This soil is medium in natural fertility and moderate in organic matter content. Except where the soil is limed, reaction in the fragipan is generally slightly acid to very strongly acid. Permeability is slow in the fragipan, and the available water capacity is moderate. The root zone is moderately deep. Tilth is good, and the soil can be worked throughout a wide range of moisture content. A seasonal high water table is at a depth of 12 to 24 inches. Runoff is slow. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Otwell, Newark, and a somewhat poorly drained soil without a fragipan. Some areas of included soils are subject to ponding. A few areas are on uplands and are not subject to flooding.

Most of this soil is being used for pasture and hay. A few areas are in cultivated crops.

The seasonal high water table and fragipan are the major limitations of this soil for growing cultivated crops. Planting and harvesting are sometimes delayed by wetness. When some type of surface drainage system is used, this soil is suited to corn and soybeans. Yields are moderate. Conservation tillage, return of crop residue to the soil, and a cover crop help maintain desirable soil structure and organic matter content.

This soil has high productivity for trees. Preferred species for planting are yellow-poplar, white ash, American sycamore, sweetgum, and black willow and southern red oaks. Equipment limitations and plant competition are management concerns.

This soil is suited to pasture and hay crops that tolerate some wetness. The fragipan restricts deep rooted legumes. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil is poorly suited to most urban development. Wetness, flooding, and slow permeability in the fragipan are limitations for sanitary facilities and building site development. In addition, this soil is limited by low strength for local roads and streets and for use as roadfill.

This Lawrence soil is in capability subclass IIIw and woodland group 2w.

Ld—Lindside silt loam, occasionally flooded. This deep, moderately well drained, nearly level soil is on flood plains. Individual areas generally are in bands 150 to 300 feet wide and range from 5 acres to about 190 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil, from 7 to 41 inches, is brown silt loam that has gray mottles below a depth of 19 inches. The underlying material at a depth of 41 to 67 inches is mottled dark yellowish brown, dark grayish brown, and grayish brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from slightly acid to strongly acid in the subsoil and from medium acid to neutral in the underlying material. Permeability is moderate or moderately slow, and the available water capacity is high. This soil is easy to till throughout a wide range of moisture content. It has a seasonal high water table at a depth of 18 to 36 inches. The root zone is deep. Runoff is medium. This soil is subject to occasional flooding for very brief periods, usually late in winter and early in spring.

Included with this soil in mapping are small areas of Boonesboro, Huntington, Newark, and Nolin soils.

Most of the acreage of this soil is used for cultivated crops, hay, and pasture.

This soil is well suited to most cultivated crops commonly grown in the area. Artificial drainage usually is not needed. If used during wet seasons, it permits an earlier planting and reduces the risk of damage to water sensitive crops. Conservation tillage, return of crop residue to the soil, and a cover crop help maintain desirable soil structure and organic matter content. A cover crop of small grain is sometimes damaged by winter flooding. In places, diversions on higher adjacent areas protect the flood plain from runoff.

This soil is suited to most of the pasture and hay crops commonly grown in the area, although some hay crops may be damaged by flooding. The desired species can be maintained by renovation. Application of lime and fertilizer, proper stocking rates, and weed control are needed.

This soil has very high productivity for trees. The preferred species for planting are eastern white and shortleaf pines, yellow-poplar, black walnut, white ash, and black and northern red oaks. Plant competition is a management concern.

This soil is poorly suited to most urban development because of flooding and wetness.

This Lindside soil is in capability class IIw and woodland group 1o.

Figure 17.—Stripcropped burley tobacco on Lowell silt loam, 2 to 6 percent slopes. The sod strips help control erosion.

LwB—Lowell silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops. Individual areas are irregular in shape and range from about 3 to 40 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of 46 inches. It is yellowish brown silty clay loam in the upper part and strong brown clay in the lower part. The lower part of the subsoil, at a depth of 46 to 57 inches, is mottled yellowish brown and light brownish gray clay. Limestone bedrock is at a depth of 57 inches.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow, and the available water capacity is high. Reaction ranges from slightly acid to very strongly acid to a depth of 30 inches, unless the soil is limed. Below a depth of 30 inches, reaction is strongly acid to mildly alkaline. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep. Runoff is medium. The clayey subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Faywood, Nicholson, and Maury soils.

Most of this soil is used for cultivated crops, hay, and pasture. Some large areas are in residential and urban developments. A few areas are idle.

This soil is well suited to all the cultivated crops commonly grown in the area. Crops respond well to applications of lime and fertilizer. Erosion is a moderate hazard. Some measures for controlling erosion are needed if cultivated crops are grown; stripcropping is an example (fig. 17). Conservation tillage, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control erosion and maintain productivity.

This soil is well suited to all pasture and hay crops commonly grown in the area. If properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are yellow-poplar, eastern white pine, white ash, and black, northern red, and white oaks. Plant competition is a management concern.

This soil is suited to urban development. It is limited by moderately slow permeability, clayey texture, and depth to bedrock for sanitary facilities. It is limited by low strength for local roads and streets and for use as roadfill. Depth to bedrock, clayey texture, and shrink-swell are limitations for building site development.

This Lowell soil is in capability subclass IIe and woodland group 2c.

LwC—Lowell silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on ridgetops, shoulder slopes, and hillsides. Individual areas are irregularly shaped and range from about 3 to 150 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of 46 inches. It is yellowish brown silty clay loam in the upper part and strong brown clay in the lower part. The lower part of the subsoil, at a depth of 46 to 57

Figure 18.—Rotational grazing helps maintain pasture on Lowell silt loam, 6 to 12 percent slopes.

inches, is mottled yellowish brown and light brownish gray clay. Limestone bedrock is at a depth of 57 inches.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow, and the available water capacity is high. Unless it is limed, the soil ranges from slightly acid to very strongly acid to a depth of 30 inches. Below a depth of 30 inches, it is strongly acid to mildly alkaline. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep. The clayey subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Faywood, Maury, and Nicholson soils. Also included are a few areas of severely eroded soils that have a silty clay loam surface layer.

Most of this soil is used for pasture, hay, and cultivated crops. Some areas are used for subdivisions.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. The response of crops to lime and fertilizer is fair. The hazard of erosion is severe. Measures for controlling erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control erosion and maintain productivity.

This soil is well suited to pasture and hay. Yields are moderate if the soil is properly managed (fig. 18). Plants should be selected which provide satisfactory ground cover and prevent erosion. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. Preferred species for planting are yellow-poplar; eastern white pine; white, black, and northern red oaks; and white ash. Plant competition is a management concern.

This soil is suited to some urban development. Moderately slow permeability, clayey texture, and slope are limitations for sanitary facilities. The soil is limited by low strength for local roads and streets and for use as roadfill. Depth to bedrock, clayey texture, slope, and shrink-swell are limitations for building site development.

This Lowell soil is in capability subclass IIIe and woodland group 2c.

MaB—Maury silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops. Individual areas are generally irregular in shape and range from about 3 to 90 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of 25 inches, is brown silt loam and reddish brown silty clay loam. The middle part, at a depth of 25 to 46 inches, is yellowish red silty clay. The lower part, at a depth of 46 to 64 inches, is yellowish red clay that has common yellowish brown mottles.

This soil is high in natural fertility and moderate in organic matter content. The surface layer ranges from neutral to strongly acid. The subsoil ranges from slightly acid to strongly acid in the upper part and from medium acid to very strongly acid in the lower part. Permeability is moderate to moderately rapid, and available water capacity is high. Runoff is medium. This soil is easy to till throughout a wide range of moisture content. The root zone is deep.

Included with this soil in mapping are small areas of McAfee, Faywood, Lowell, and Nicholson soils.

Most of this soil is used for cultivated crops, pasture, and hay. Some areas are residential or in urban development.

This soil is well suited to all the cultivated crops commonly grown in the area. Crops respond well to applications of lime and fertilizer. Erosion is a moderate hazard. Some measures for controlling erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, use of a cover crop, and grasses and legumes in the cropping system help control erosion and maintain productivity.

This soil is well suited to all of the pasture and hay crops commonly grown in the area. If properly managed, it produces high yields. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are black walnut; yellow-poplar; white ash; eastern white pine; and black, white, and northern red oaks. Plant competition is a management concern.

This soil is well suited to most urban development. Seepage and clayey texture are limitations for some sanitary facilities. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Maury soil is in capability subclass IIe and woodland group 2o.

MaC—Maury silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on shoulder slopes and hillsides. Individual areas are irregular in shape and range from about 3 to 100 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of 25 inches, is brown silt loam and reddish brown silty clay loam. The middle part, at a depth of 25 to 46 inches, is yellowish red silty clay. The lower part, at a depth of 46 to 64 inches, is yellowish red clay that has common yellowish brown mottles.

This soil is high in natural fertility and moderate in organic matter content. The surface layer ranges from neutral to strongly acid. The subsoil ranges from slightly acid to strongly acid in the upper part, and in the lower part it ranges from medium acid to very strongly acid. Permeability is moderate to moderately rapid, and the

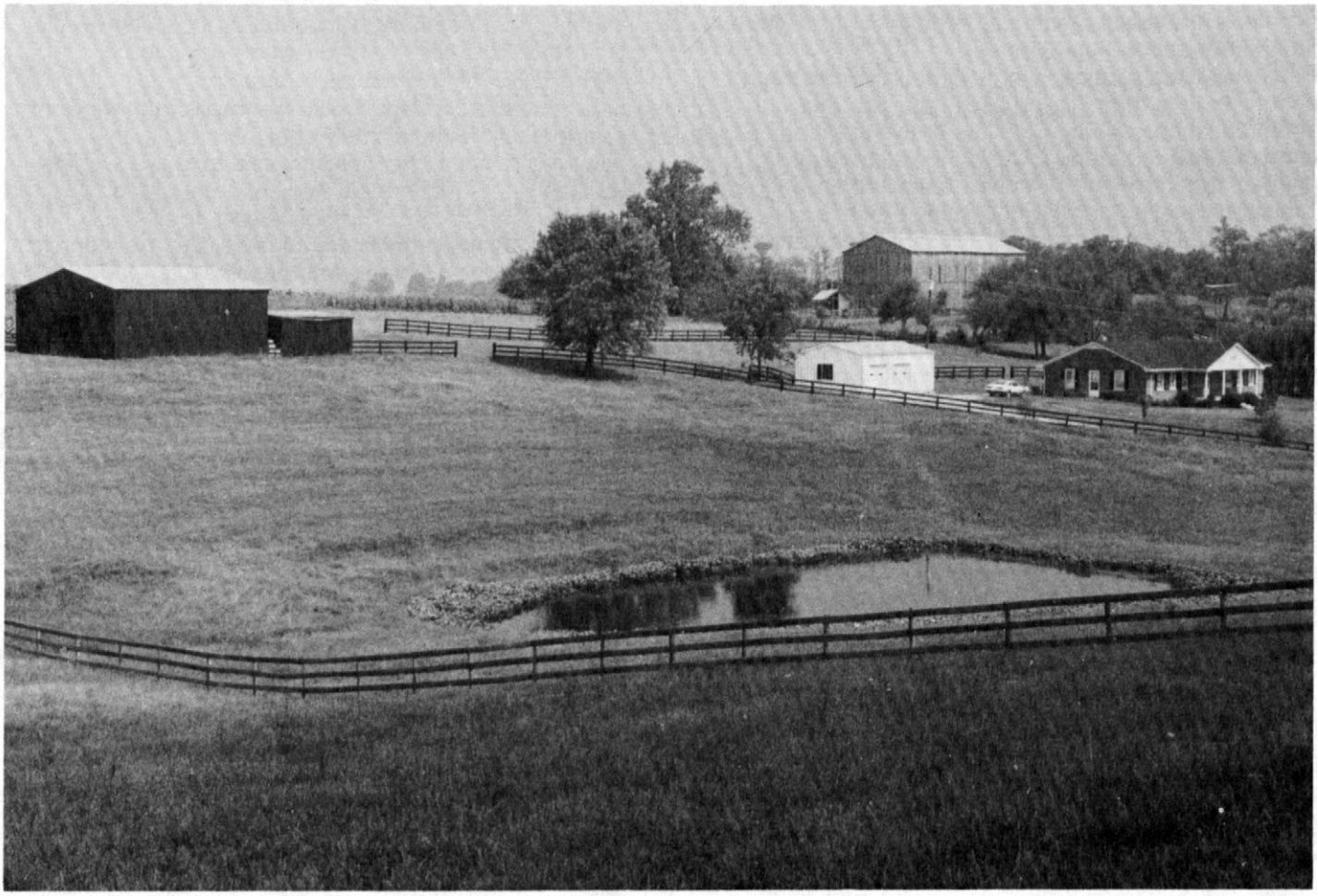


Figure 19.—Maury silt loam, 6 to 12 percent slopes, is well suited to pasture. The buildings are on Maury silt loam, 2 to 6 percent slopes.

available water capacity is high. This soil is easy to till throughout a wide range of moisture content. The root zone is deep.

Included with this soil in mapping are small areas of McAfee, Faywood, Lowell, and Nicholson soils.

Most of this soil is used for hay, pasture, and cultivated crops. Some areas are residential or in urban development.

This soil is well suited to all the cultivated crops commonly grown in the area. Crops respond well to applications of lime and fertilizer. Erosion is a severe hazard. Measures for controlling erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control erosion and maintain productivity.

This soil is well suited to all the pasture and hay crops commonly grown in the area (fig. 19). If properly managed, it produces high yields. Adequate ground cover prevents erosion. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are black walnut; yellow-poplar; white ash; eastern white pine; and black, white, and northern red oaks. Plant competition is a management concern.

This soil is suited to most urban development. Seepage, clayey texture, and slope are limitations for some sanitary facilities. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Maury soil is in capability subclass IIIe and woodland group 2o.

McB—McAfee silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on

ridgetops. Individual areas are irregular in shape and range from about 3 to 40 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil, at a depth of 7 to about 26 inches, is silty clay. It is brown in the upper part and yellowish red in the lower part. The underlying material to a depth of 31 inches is reddish brown clay. Limestone bedrock is at a depth of 31 inches.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from medium acid to neutral. Immediately above bedrock, however, it ranges from slightly acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is moderate. This soil is easy to till throughout a fairly wide range of moisture content. The root zone is moderately deep. The clayey subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Maury and Faywood soils.

Most of this soil is used for cultivated crops, hay, and pasture. Some small tracts are used for housing.

This soil is suited to most cultivated crops grown in the area. Crops respond well to fertilizer and lime. Erosion is a moderate hazard. Measures for controlling erosion are needed. Conservation tillage, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control erosion and maintain maximum productivity.

This soil is well suited to the pasture and hay crops grown in the area. If the soil is properly managed, yields are moderate. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. Preferred species for planting are eastern white pine; yellow-poplar; black, white, and northern red oaks. Plant competition is a management concern.

This soil is suited to some urban development. Moderately slow permeability, depth to bedrock, and clayey texture are limitations for sanitary facilities. Depth to bedrock is a limitation for shallow excavations and buildings with basements. The soil is limited by low strength for local roads and streets and for use as roadfill.

This McAfee soil is in capability subclass IIe and woodland group 3c.

McC—McAfee silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping soil is on ridgetops, shoulder slopes, and side slopes. Some areas have a karst topography (fig. 20). Individual areas are irregular in shape and range from about 3 to 75 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil, at a depth of 7 to about 26 inches, is silty clay. It is brown in the upper part and yellowish red in the lower part. The underlying material, to a depth of 31 inches, is reddish brown clay. Limestone bedrock is at a depth of 31 inches.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from medium acid to neutral. Immediately above the bedrock, however, it ranges from slightly acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is moderate. This soil is easy to till throughout a fairly wide range of moisture content. The root zone is moderately deep. The clayey subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Maury and Faywood soils. Also included are small areas of eroded soils that have a brown silty clay loam surface layer.

This soil is used mainly for pasture, hay, and cultivated crops. A very small acreage is in subdivisions.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Response to lime and fertilizer is fair. The hazard of erosion is severe. Measures for controlling erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control erosion and maintain productivity.

This soil is suited to pasture and hay. Yields are moderate if the soil is properly managed. Satisfactory ground cover helps prevent further erosion. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. The preferred species for planting are eastern white pine; yellow-poplar; and white, black, and northern red oaks. Plant competition is a management concern.

This soil is poorly suited to most urban development. Moderately slow permeability, slope, depth to bedrock, and clayey texture are limitations for sanitary facilities. Depth to bedrock is a limitation for shallow excavations and buildings with basements. The soil is limited by low strength for local roads and streets and for use as roadfill.

This McAfee soil is in capability subclass IIIe and woodland group 3c.

McD—McAfee silt loam, 12 to 20 percent slopes. This moderately deep, well drained, strongly sloping soil is on hillsides and areas of karst topography. Individual areas are irregular in shape and range from about 3 to 70 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is brown silty clay in the upper part and yellowish red silty clay in the lower part. The underlying material to a depth of 31 inches is reddish brown clay. Limestone bedrock is at a depth of 31 inches.

Figure 20.—Pasture on karst topography in an area of McAfee silt loam, 6 to 12 percent slopes.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from medium acid to neutral. Immediately above bedrock, however, it ranges from slightly acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is moderate. This soil is easy to till throughout a fairly wide range of moisture content. The root zone is moderately deep. The clayey subsoil has a moderate shrink-swell potential.

Included with this soil in mapping are small areas of Faywood and Fairmount soils. Also included are small areas of eroded soils that have a brown silty clay loam surface layer.

Most of this soil is used for pasture and hay. Some small areas are in cultivated crops.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Erosion is a very severe hazard. Measures for controlling erosion are needed if cultivated crops are grown. Conservation tillage, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control further erosion and maintain productivity.

This soil is suited to pasture and hay. If properly managed, it produces moderate yields. Satisfactory ground cover helps prevent further erosion. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. The preferred species for planting are eastern white pine; yellow-poplar; and white, black, and northern red oaks. The hazard of erosion, equipment limitations and plant competition are management concerns

This soil is poorly suited to most urban uses. Slope and depth to bedrock are limitations for sanitary facilities and building site development. The soil is limited by low strength for local roads and streets and for use as roadfill.

This McAfee soil is in capability subclass IVe and woodland group 3c.

MdD—McAfee-Rock outcrop complex, 6 to 20 percent slopes. This map unit is made up of moderately deep, well drained, sloping and strongly sloping soil and Rock outcrop on hillsides and some narrow ridgetops. The McAfee soil and Rock outcrop were mapped together as a complex because they are so intermingled

that mapping them separately was impractical. Generally, the McAfee soil is throughout the complex, but it is more dominant on slopes of less than 12 percent. Rock outcrop is primarily on the steeper slopes. Individual areas of this complex are irregular in shape and range from about 5 to 30 acres.

The McAfee soil makes up about 75 percent of the complex. Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is brown silty clay in the upper part and yellowish red silty clay in the lower part. The underlying material to a depth of 31 inches is reddish brown clay. Limestone bedrock is at a depth of 31 inches.

This soil is high in natural fertility and moderate in organic matter content. Reaction ranges from medium acid to neutral. Immediately above bedrock, however, it ranges from slightly acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is moderate. The root zone is moderately deep. The clayey subsoil has a moderate shrink-swell potential.

Rock outcrop makes up about 20 percent of the complex. Typically, it is exposed limestone bedrock scattered throughout the unit. It is more common on the strongly sloping soils. These outcrops generally run parallel to the slope. In some areas flagstones and boulders are on the surface.

Included with this complex in mapping are small areas of Faywood and Fairmount soils.

About half the acreage of this complex has been cleared and is used as pasture. The remainder is wooded or in brush.

This complex is poorly suited to cultivated crops because of the slope, hazard of erosion, and rock outcrop.

This complex is poorly suited to pasture and hay because of the severe hazard of erosion and the Rock outcrop. Maintenance of the desired species of grasses and legumes is severely restricted. Plant species should be selected which do not require frequent renovation and which provide adequate ground cover. Stocking rates should be adjusted to prevent overgrazing.

This complex has moderately high productivity for trees. The preferred species for planting are eastern white pine; yellow-poplar; and white, black, and northern red oaks. Plant competition, equipment limitations, and the hazard of erosion are management concerns.

This McAfee soil is poorly suited to most urban development. Rock outcrop, depth to bedrock, moderately slow permeability, slope, and clayey texture are limitations for shallow excavations and buildings with basements. The soil is limited by low strength for local roads and streets and for use as roadfill.

This McAfee soil is in capability subclass VIs and woodland group 3c.

Me—Melvin silt loam, occasionally flooded. This deep, poorly drained, nearly level soil is on flood plains. Individual areas are generally small, irregularly shaped, and about 3 to 30 acres.

Typically, the surface layer is grayish brown silt loam about 8 inches thick. The subsoil, at a depth of 8 to 28 inches, is light brownish gray silt loam that has common mottles of yellowish brown and dark grayish brown. The underlying material, at a depth of 28 to 65 inches, is light olive gray silt loam that has many yellowish brown and reddish brown mottles.

This soil is low in natural fertility and in organic matter content. Reaction ranges from slightly acid to mildly alkaline throughout. Permeability is moderate, and the available water capacity is high. Runoff is slow. This soil is easy to till. A seasonal high water table is at or near the surface. This soil is subject to occasional flooding for brief periods, usually late in winter and early in spring.

Included with this soil in mapping are small areas of Dunning and Newark soils. Also included are some areas of soils that are subject to ponding after heavy rains.

Most of this soil is used for cultivated crops, hay, or pasture. Some areas are woodland.

A seasonal high water table is the major limitation of this soil for growing cultivated crops. Planting and harvesting are sometimes delayed by wetness. Subsurface drainage systems are commonly used to correct this problem. When drained, this soil is suited to corn and soybeans and can be cropped intensively. Conservation tillage, return of crop residue to the soil, and a cover crop help maintain desirable soil structure and organic matter content. A cover crop of small grain is sometimes damaged by winter flooding.

This soil is well suited to pasture and hay crops that tolerate wetness, although some hay crops may be damaged by flooding. The desired species can be maintained by renovation. Application of fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil has very high productivity for trees. Preferred species for planting are pin and willow oaks, American sycamore, sweetgum, and baldcypress. Plant competition, equipment limitations, and seedling mortality are management concerns.

This soil is poorly suited to most urban development because of flooding and wetness.

This Melvin soil is in capability subclass IIIw and woodland group 1w.

Ne—Newark silt loam, occasionally flooded. This deep, somewhat poorly drained, nearly level soil is on flood plains. Individual areas are irregularly shaped and range from about 4 to 200 acres or more.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of 16 inches, is brown silt loam that has common, light brownish gray mottles. The lower part, at

a depth of 16 to 32 inches, is light brownish gray silt loam that has common, brown mottles. The underlying material to a depth of 64 inches is light brownish gray silt loam that has common to many mottles in shades of gray and brown.

This soil is high in natural fertility, and moderate in organic matter content. Reaction ranges from medium acid to mildly alkaline throughout. Permeability is moderate, and available water capacity is high. This soil can be tilled throughout a wide range of moisture content. A seasonal high water table at a depth of 6 to 18 inches sometimes delays planting and harvesting. Runoff is very slow. This soil is subject to brief periods of occasional flooding, usually late in winter and early in spring.

Included with this soil in mapping are small areas of Dunning, Melvin, and Lindside soils. Also included are a few small areas of soils that are subject to ponding.

Most of this soil is in cultivated crops, hay, and pasture. A few small areas are woodland.

A seasonal high water table is the major limitation of this soil for cultivated crops. Planting and harvesting are sometimes delayed by wetness. Subsurface drainage systems are commonly used to correct the wetness of this soil. When drained, the soil is well suited to corn and soybeans and may be cropped intensively. Conservation tillage, return of crop residue to the soil, and a cover crop help maintain desirable soil structure and organic matter content. A cover crop of small grain is sometimes damaged by winter flooding.

This soil is well suited to pasture and hay crops that tolerate some wetness. Some hay crops, however, may be damaged by flooding. The desired species can be maintained through renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, rotational grazing, and weed control are needed.

Although most areas are cleared, this soil has very high productivity for trees. Preferred species for planting are eastern cottonwood, sweetgum, American sycamore, and eastern white pine. Plant competition and equipment limitations are management concerns.

This soil is poorly suited to most urban development because of flooding and wetness.

This Newark soil is in capability subclass IIw and woodland group 1w.

NhB—Nicholson silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on ridgetops. Individual areas are irregular in shape and range from about 3 to 75 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of 27 inches. It is dark yellowish brown silt loam in the upper part and yellowish-brown silty clay loam in the lower part. A very firm, compact and brittle fragipan is at a depth of 27 to 39 inches. It is dark yellowish brown silty clay loam that has common, light brownish gray and pale brown mottles. The lower part of the subsoil, to a depth of 48 inches, is yellowish brown silty clay that has common brown and gray mottles. The underlying material at a depth of 48 to 62 inches is dark yellowish brown silty clay that has common mottles in shades of gray.

This soil is medium in natural fertility and moderate in organic matter content. Except where the soil is limed, reaction ranges from medium acid to very strongly acid through the fragipan and from strongly acid to mildly alkaline below the fragipan. Permeability is slow in the fragipan, and the available water capacity is moderate. This soil can be tilled throughout a wide range of moisture content. The root zone is moderately deep. Runoff is medium. A seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are small areas of Lowell soils and a few small areas of a moderately well drained soil without a fragipan. Also included are areas of Otwell soils which are on stream terraces and are not subject to flooding.

Most of this soil is used for cultivated crops, hay, and pasture.

This soil is well suited to most cultivated crops. The seasonal high water table may limit yields of tobacco during wet seasons. Crops respond well to lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate. Some measures to control erosion are needed. Conservation tillage, stripcropping, return of crop residue to the soil, a cover crop, and grasses and legumes in the cropping system help control erosion and maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. If properly managed, it produces high yields (fig. 21). The fragipan restricts rooting depth and may limit production of deep rooted legumes in some years. Plants selected for pasture and hay should produce adequate forage and provide satisfactory ground cover. The desired species can be maintained by frequent renovation. Application of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and weed control are needed.

This soil has high productivity for trees. The preferred species for planting are black oak, yellow-poplar, white oak, eastern white pine, sweetgum, and northern red oak. Plant competition is a management concern.

This soil is suited to most urban development, but wetness and slow permeability are limitations for sanitary facilities, shallow excavations, and buildings. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Nicholson soil is in capability subclass IIe and woodland group 2o.

No—Nolin silt loam, occasionally flooded. This deep, well drained, nearly level soil is on the flood plains of streams throughout the survey area, except along

Figure 21.—Proper management produces high quality pasture on Nicholson silt loam, 2 to 6 percent slopes.

Elkhorn Creek in Franklin County. Individual areas range from about 5 to 150 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil extends to a depth of 57 inches. It is dark yellowish brown silt loam in the upper part and brown silt loam in the lower part. The underlying material at a depth of 57 to 64 inches is brown silt loam with strata of fine sandy loam.

This soil is high in natural fertility and moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderate, and available water capacity is high. Runoff is medium. This soil can be easily tilled throughout a wide range of moisture content. The root zone is deep, and runoff is medium. This soil is subject to brief periods of occasional flooding, usually late in winter or early in spring.

Included with this soil in mapping are small areas of Boonesboro, Lindside, and Huntington soils. Also included are soils along the major streambanks with slopes of 2 to 12 percent. These soils are subject to frequent flooding, which results in erosion and deposition. Some areas along the Salt River, near Glensboro in Anderson County, are within the flood pool of Taylorsville Lake.

Most of this soil is used for cultivated crops, hay, and pasture.

If this soil is properly fertilized and organic matter content is maintained, it is productive and can be cropped intensively. A cover crop of small grain is

sometimes damaged by winter flooding. Conservation tillage, return of crop residue to the soil, and a cover crop help maintain desirable soil structure and organic matter content.

All of the pasture and hay crops commonly grown in the area are well suited to this soil, although some hay crops may be damaged by flooding. Maintaining the desired species, weed control, proper stocking rates, and application of fertilizer are needed.

This soil has very high productivity for trees. Preferred species for planting are black walnut, eastern cottonwood, northern red oak, sweetgum, white ash, and yellow-poplar. Plant competition is a management concern.

This soil is poorly suited to most urban development because of flooding.

This Nolin soil is in capability subclass IIw and woodland group 1o.

OtA—Otwell silt loam, rarely flooded, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on stream terraces. Individual areas are irregular in shape and range from about 3 to 25 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 24 inches. It is yellowish brown silt loam in the upper part and silty clay loam in the lower part. A very firm, compact and brittle fragipan is at a depth of 24 to 58 inches. It is yellowish brown silt loam in the upper part and mottled grayish brown and strong brown silty clay loam in the lower part. The lower part of the subsoil from 58 to 70 inches is mottled strong brown and light brownish gray silty clay loam.

This soil is medium in natural fertility and moderate in organic matter content. Except where the soil is limed, reaction is strongly acid or very strongly acid through the fragipan and medium acid or strongly acid below the fragipan. Permeability is very slow in the fragipan, and the available water capacity is moderate. This soil can be tilled throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches. Runoff is medium. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Lawrence and Elk soils and small areas of a moderately well drained soil without a fragipan. A few areas of included soils on higher elevations are not subject to flooding.

Most of this soil is being used for cultivated crops, hay, and pasture. Some areas are in urban development.

This soil is well suited to most of the cultivated crops commonly grown in the area. The seasonal high water table may limit yields of tobacco during wet seasons. Crops respond well to lime and fertilizer. Erosion is a slight hazard. This soil can be cropped intensively if properly managed. Conservation tillage, return of crop residue to the soil, and a cover crop help to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. If properly managed, it produces high yields. The fragipan restricts rooting depth and may limit production of deep rooted legumes in some years. Plants selected for pasture and hay should produce adequate forage and provide satisfactory ground cover. The desired species can be maintained by frequent renovation of pasture. Application of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. The preferred species for planting are eastern white pine, black and white oaks, white ash, and shortleaf pine. Seedling mortality is a management concern.

This soil is suited to some urban development. Wetness, flooding, and very slow permeability are limitations for sanitary facilities and buildings. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Otwell soil is in capability subclass IIw and woodland group 3o.

OtB—Otwell silt loam, rarely flooded, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on stream terraces. Individual areas are irregular in shape and range from about 3 to 25 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The upper part of the subsoil extends to a depth of about 24 inches. It is yellowish brown silt loam in the upper part and silty clay loam in the lower part. A very firm, compact and brittle fragipan is at a depth of 24 to 58 inches. It is yellowish brown silt loam in the upper part and mottled grayish brown and strong brown silty clay loam in the lower part. The lower part of the subsoil at a depth of 58 to 70 inches is mottled strong brown and light grayish brown silty clay loam.

This soil is medium in natural fertility and moderate in organic matter content. Except where the soil is limed, reaction is strongly acid or very strongly acid through the fragipan and medium acid or strongly acid below the fragipan. Permeability is very slow in the fragipan, and the available water capacity is moderate. This soil can be tilled throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches. Runoff is medium. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Lawrence and Elk soils and small areas of a moderately well drained soil without a fragipan. A few areas of included soils on higher elevations are not subject to flooding.

Most of this soil is used for cultivated crops, hay, and pasture. Some areas are in urban development.

This soil is well suited to most cultivated crops commonly grown in the area. The seasonal high water table may limit yields of tobacco during wet seasons. Crops respond well to lime and fertilizer. The hazard of erosion is moderate. Some measures for controlling erosion are needed. Conservation tillage, stripcropping, return of crop residue to the soil, and a cover crop help control erosion and maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. If properly managed, it produces high yields. The fragipan restricts rooting depth and may limit production of deep rooted legumes in some years. Plants selected for pasture and hay should produce adequate forage and provide satisfactory ground cover. The desired species can be maintained by frequent renovation of pasture. Application of lime and fertilizer, maintenance of proper stocking rates, rotational grazing, and weed control are needed.

This soil has moderately high productivity for trees. Preferred species for planting are eastern white pine, black and white oaks, white ash, and shortleaf pine. Plant competition is a management concern.

This soil is suited to some urban development. Wetness, flooding, and very slow permeability in the fragipan are limitations for sanitary facilities and buildings. The soil is limited by low strength for local roads and streets and for use as roadfill.

This Otwell soil is in capability subclass IIe and woodland group 3o.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that all levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal input of energy and money, and farming it results in the least damage to the environment.

Prime farmland must either be used for producing food or fiber or be available for these uses. It may now be in crops, pasture, woodland, or other land, but not urban or built-up land or water areas. Urban and built-up land is any contiguous area of 10 or more acres that is used for residences, industrial sites, commercial sites, construction sites, institutional sites, public administrative sites, railroad yards, small parks, cemeteries, airports, golf courses, or similar uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It has favorable temperature, growing season, and soil reaction. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

About 18,100 acres, or 14 percent, of Anderson County and about 36,290 acres, or 27 percent, of Franklin County meet the soil requirements of prime farmland. Areas are scattered throughout the counties, but most are in general soil map unit 2 in Anderson County and map units 2, 3, 5, and 6 in Franklin County.

Detailed soil map units that make up prime farmland in Anderson and Franklin Counties are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

Soils that have limitations—a high water table, flooding, or inadequate rainfall—may qualify as prime farmland if these limitations are overcome by such measures as drainage, flood control, or irrigation. In the following list, measures needed to overcome these limitations, if any, are shown in footnotes at the end of this section. Onsite evaluation is necessary to see if the limitations have been overcome by corrective measures.

The map units that meet the soil requirements for prime farmland are:

- AsA Ashton silt loam, rarely flooded, 0 to 2 percent slopes
- AsB Ashton silt loam, rarely flooded, 2 to 6 percent slopes
- Bo Boonesboro silt loam, occasionally flooded [1]
- Du Dunning silty clay loam, occasionally flooded [2]
- EkB Elk silt loam, 2 to 6 percent slopes
- ElB Elk silt loam, rarely flooded, 2 to 6 percent slopes
- Hu Huntington silt loam, occasionally flooded [1]
- Lc Lawrence silt loam, rarely flooded [2]
- Ld Lindside silt loam, occasionally flooded [1]
- LwB Lowell silt loam, 2 to 6 percent slopes
- MaB Maury silt loam, 2 to 6 percent slopes
- McB McAfee silt loam, 2 to 6 percent slopes
- Me Melvin silt loam, occasionally flooded [2]
- Ne Newark silt loam, occasionally flooded [2]
- NhB Nicholson silt loam, 2 to 6 percent slopes
- No Nolin silt loam, occasionally flooded [1]
- OtA Otwell silt loam, rarely flooded, 0 to 2 percent slopes [1]
- OtB Otwell silt loam, rarely flooded, 2 to 6 percent slopes

[1] Where protected from flooding.

[2] Where protected from flooding and where drained.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

William H. Amos, Jr., agronomist, and Carl W. Hail, assistant state soil scientist, Soil Conservation Service, assisted in preparing this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

More than 165,000 acres in the survey area was used for crops and pasture in 1967 (*16*). Of this total more than 120,000 acres was used for permanent pasture; 12,000 acres for row crops, mainly corn and tobacco; 1,700 acres for close grown crops, mainly wheat; 17,000 acres for rotation hay and pasture; and 6,600 acres for hay. The remainder of the acreage was mostly idle cropland and land in conservation use only. The acreage of crops and pasture has remained steady in years prior to 1982 (*8*).

The soils of Anderson and Franklin Counties have potential for increased crop production. According to the 1970 Kentucky Soil and Water Conservation Needs Inventory, about 15,700 acres of potentially good cropland was used as pasture, about 3,800 acres for woodland, and about 800 acres was idle and formerly cropped open land. In addition to the reserve production capacity represented by this land, crop production could also be increased by applying the latest production techniques to all cropland in the area.

In 1967, an estimated 15,000 acres was urban and built-up land in Anderson and Franklin Counties. Since then this acreage has increased significantly, and in many areas cropland has been replaced. This survey can help in making land use decisions that can influence the future rate of farming in the survey area (see the section "General Soil Map Units").

Soil erosion is the major hazard on most of the cropland and pastureland in the survey area. If the slope is more than 2 percent, erosion is a hazard. In Anderson and Franklin Counties, most of the grain row crops, such as corn, are grown on the nearly level and gently sloping flood plains and stream terraces. The majority of the tobacco is grown on the gently sloping and sloping ridgetops. Hay and pasture are grown primarily on the ridges and sloping to moderately steep hillsides. All of these soils have slopes of more than 2 percent, except some of the soils on flood plains and stream terraces.

Loss of the surface layer by erosion is damaging. Productivity is reduced as organic matter and nutrients are lost and as part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging to soils that have a clayey subsoil, such as Lowell and Maury soils. Erosion also further limits the depth of the root zone in soils that have a limiting layer in or below the subsoil or are shallow to bedrock. The Lawrence, Nicholson, and Otwell soils have a fragipan, and the Fairmount, Faywood, and McAfee soils are shallow and moderately deep to bedrock. Erosion also results in the pollution of streams by sediment. Polluted streams impair the quality of water for municipal and recreational use and for use by livestock, fish, and wildlife.

Erosion control practices reduce damage from runoff and increase infiltration. A cropping system that keeps vegetative cover or crop residue on the soil for extended periods can reduce soil losses by erosion to amounts that do not reduce the productive capacity.

The trend in Anderson and Franklin Counties is to control erosion by conservation tillage practices, such as crop rotation and use of cover crops, instead of structural practices, such as terraces and diversions.

Information on design and application of erosion control practices for each kind of soil in the survey area is available in the local offices of the Soil Conservation Service.

Drainage is the major management need on about 2 percent of the acreage used for crops and pasture. Production of crops common to the area is restricted on very poorly drained to somewhat poorly drained soils unless the soils are artificially drained. The Dunning, Lawrence, Melvin, and Newark soils, which make up about 3,200 acres of the survey area, need drainage. In most places, open ditch drainage is needed to remove

Figure 22.—Cut and baled hay for feed in an area of Lowell silt loam, 6 to 23 percent slopes.

Figure 23.—Hayland on Elk silt loam, 2 to 6 percent slopes, foreground; small grain on Nolin silt loam, center; and pasture and woodland on McAfee silt loam, 12 to 30 percent slopes, background.

excess water. Subsurface drainage has been used successfully on the Newark and Melvin soils. In some areas the lack of an adequate outlet for drainage systems is a major concern. On the moderately well drained Lindside, Nicholson, and Otwell soils, artificial drainage is generally not needed. Crops that tolerate occasional wetness should be selected.

A successful livestock program is dependent on a supply of large quantities of homegrown feed of adequate quality (fig. 22). This forage can furnish up to 78 percent of the feed for beef cattle and 66 percent for dairy cattle (*7*).

The soils in the survey area vary widely in their capabilities because of differences in depth to bedrock or limiting layers, internal drainage, ability to supply moisture, and many other properties (fig. 23). Grasses and legumes and grass-legume combinations also vary in their ability to grow on different soils. It is important to match the plant species or mixture of species to the soil. This achieves the greatest yields with maximum soil and water conservation.

Level to gently sloping, deep, well drained soils, such as Ashton soils, are best used for high producers, such as corn for silage, alfalfa, or a mixture of alfalfa-orchardgrass or alfalfa-timothy.

Steeper soils should be maintained in sod-forming grasses, such as tall fescue or bluegrass, to minimize soil erosion. Alfalfa should be used with a cool-season

Figure 24.—Controlling stocking rates helps prevent overgrazing of pasture on Eden flaggy silty clay, 25 to 35 percent slopes.

grass where the soils are at least 2 feet deep to bedrock and are well drained. Where soils are less than 2 feet deep or have drainage problems, clover-grass mixtures or pure grass stands can be used. Legumes can be established in grass-dominant sods by renovation.

Plants need to be adapted not only to the soil but also to the intended use. Selected plants should provide maximum quality and versatility in the forage program. Legumes generally produce higher quality feed than grasses, resulting in higher animal performance. They should be used to the maximum extent possible. Taller growing legumes, such as alfalfa and red clover, are more versatile than legumes primarily used for grazing, such as white clover. Grasses, such as orchardgrass, timothy, and tall fescue, are better adapted for hay and silage.

Tall fescue is an important cool-season grass suited to a wide range of soil conditions. It is used for both hay and pasture. Growth occurs during August through November. Nitrogen fertilizer is one of the important keys for maximum production during this period. Desired production levels determine the rate of application. Grazing is deferred until late in fall and in winter.

One way of increasing the yields of pasture and hay fields is by renovation. Renovation is the improvement of pasture and hay fields by partial destruction of the sod and then liming, fertilizing, and seeding to reestablish desirable forage plants. Adding legumes to these fields provides high quality feed. Legumes increase summer production and take nitrogen from the air. Alfalfa is the most efficient nitrogen fixing legume grown in Kentucky. Other legumes in order of their nitrogen fixing ability are red clover, ladino clover, Korean lespedeza, and vetch.

Warm-season grasses planted from early April to late in May would alleviate the summer slump of cool-season grasses, such as tall fescue and Kentucky bluegrass. They grow primarily from mid-June to September. This is the time when cool-season grasses taper off. Some of

the warm-season grasses are switchgrass, big bluestem, indiangrass, and Caucasian bluestem.

Over 40,000 acres of the pasture in Anderson and Franklin Counties is on the moderately steep Eden soil. Establishing and maintaining pasture on this soil is difficult because of the steep slope, the hazard of erosion, and the presence of flagstones on the surface (fig. 24). Rotating grazing and controlling stocking rates are important on this land to prevent overgrazing.

For additional information on managing pasture and hay, contact the local office of the Soil Conservation Service or the Kentucky Cooperative Extension Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum fertility management; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic

numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The capability class and subclass of each map unit is shown in table 5. The acreage of soils in each capability class and subclass is shown in Table 6. The capability classification of each map unit is also given at the end of each map unit in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Charles A. Foster, forester, Soil Conservation Service, assisted in preparing this section.

Anderson and Franklin Counties are situated in the western Mesophytic Forest Region. The woodland is approximately 33 percent central mixed hardwoods, 24 percent oak-hickory, 21 percent red cedar-hardwood, and 16 percent elm-ash-cottonwood. The remaining 6 percent is southern pine, white oak, and maple-beech types. Woodland occupies 44,900 acres, or 34 percent of the land area, in Anderson County and 39,600 acres, or 29 percent, in Franklin County (*13*).

Woodland tracts in the soil survey are small private holdings averaging about 24 acres. They are essentially unmanaged. Most woodland sites have the capability of growing 50 cubic feet or more of wood per acre per year but actually grow approximately 33 cubic feet. If proper woodland management practices are used, these soils could be more productive. Woodland tracts are not well stocked with desirable, high quality trees. Many tracts are owned less than 10 years.

With proper management, tree growth, stocking, and quality can be improved. Management includes removing low quality trees in fully stocked and under stocked stands of all sizes and regenerating sawtimber stands after harvest. Soil surveys are useful management tools to identify Kentucky's most productive woodland sites, soil limitations for woodland management, and tree species to favor or plant. Anderson and Franklin Counties have one commercial sawmill in Franklin County and one custom sawmill in Anderson County. Products or services derived from these mills include custom sawing, rough lumber, cross-ties, and poles. Several mills in adjacent counties also purchase timber from the survey area.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: w, d, c, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

William H. Casey, biologist, Soil Conservation Service, helped prepare this section.

The wildlife population of Anderson and Franklin Counties is composed of an estimated 37 species of mammals, 38 species of terrestrial reptiles and amphibians, and 109 species of birds that nest there. Many of the more than 200 other kinds of birds that visit Kentucky each year can be found in these counties during one or more of the four seasons.

The most important kinds of wildlife at present are those that furnish recreation in the form of hunting or economic gain in the form of commercial trapping. In Anderson and Franklin Counties these are the gray squirrel, fox squirrel, raccoon, mink, muskrat, white-tailed deer, cottontail rabbit, bobwhite quail, and mourning dove. Bird-watching for nongame species is also a popular activity for many outdoor enthusiasts.

Although there is much overlap in the habitat requirements of these animals, the gray squirrel, fox squirrel, and white-tailed deer are usually classified as woodland wildlife. The rabbit, quail, and dove are generally considered to be openland species, and the mink and muskrat, which spend most of their time in or about the water, are thought of as wetland wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants (*3*).

In table 9, the soils in the survey area are rated according to their potential for providing habitat for

various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bluegrass, orchardgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, and beggarweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site

features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover

for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic

matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or

weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*17*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning udic moisture regime, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that have a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*14*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*17*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ashton Series

The Ashton series consists of deep, well drained soils that have moderate permeability. These soils formed in loamy alluvium. They are on low stream terraces and alluvial fans. Slopes range from 0 to 6 percent.

Ashton soils are associated with Huntington, Boonesboro, Elk, and Otwell soils. Huntington and Boonesboro soils have a mollic epipedon more than 10 inches thick and lack an argillic horizon. Boonesboro soils are more shallow to bedrock. Elk and Otwell soils lack a mollic epipedon. The moderately well drained Otwell soils have a fragipan.

Typical pedon of Ashton silt loam, rarely flooded, 0 to 2 percent slopes; in Franklin County, approximately 0.9 mile northwest of Peaks Mill, 550 yards northwest of the junction of Kentucky Highways 1262 and 1707, and 400 feet south of Elkhorn Creek:

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.
B1—9 to 17 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; slightly acid; gradual smooth boundary.
B2t—17 to 47 inches; brown (7.5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; few pores; few clay films; few fine dark concretions; slightly acid; gradual smooth boundary.
C—47 to 68 inches; brown (7.5YR 4/4) silty clay loam; massive; 4 percent fine chert fragments; firm; common fine dark concretions; slightly acid.

The solum ranges from 40 to 60 inches in thickness. Bedrock is at a depth of 5 to 10 feet or more. Content of coarse fragments, mostly rock and chert fragments, ranges from 0 to about 5 percent. Reaction is neutral through medium acid throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3.

The B1 horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4. It is silt loam or silty clay loam.

The B2t horizon has hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

The C horizon has colors similar to those of the B horizon. It is silt loam or silty clay loam. Some pedons have strata of silty clay.

Boonesboro Series

The Boonesboro series consists of moderately deep, well drained soils. Permeability is moderate in the surface layer and rapid in the subsoil. These soils formed in alluvial material washed from upland soils of limestone, siltstone, and shale origin. They are on flood plains in narrow valleys. Slopes range from 0 to 4 percent.

Boonesboro soils are associated with Huntington, Nolin, Elk, and Ashton soils. They are more shallow to bedrock than the associated soils. Nolin and Elk soils lack a mollic epipedon. Elk and Ashton soils are on higher stream terraces and have an argillic horizon.

Typical pedon of Boonesboro silt loam, occasionally flooded; in Franklin County, 0.5 mile southwest of Swallowfield, 150 feet northwest of the junction of U.S. Highway 127 and McDonald Ferry Road:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; many fine roots; neutral; gradual smooth boundary.
A1—8 to 18 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; very friable; common fine roots; neutral; clear smooth boundary.
B2—18 to 28 inches; brown (10YR 4/3) gravelly loam; weak medium subangular blocky structure; very friable; few fine roots; 20 percent coarse fragments of limestone and chert; mildly alkaline; abrupt smooth boundary.
R—28 inches; hard limestone.

The thickness of the solum and depth to bedrock are 20 to 40 inches. Reaction ranges from slightly acid to mildly alkaline throughout.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is 0 to 10 percent limestone fragments 1/8 inch to 3 inches in diameter.

The B2 horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 2 through 4. It is 15 to 35 percent limestone fragments 1 to 3 inches in diameter. It is gravelly, cherty, or channery silt loam, loam, or silty clay loam.

Dunning Series

The Dunning series consists of deep, very poorly drained to poorly drained soils that have slow permeability. These soils formed in alluvial material that washed from upland soils of limestone origin. They are on flood plains. These flood plains are along wide valleys of the larger streams. Slopes range from 0 to 2 percent.

Dunning soils are associated with Melvin and Newark soils, which are coarser textured and lack a mollic epipedon. Melvin soils are poorly drained, and Newark soils are somewhat poorly drained.

Typical pedon of Dunning silty clay loam, occasionally flooded; located in Franklin County, approximately 1.6 miles southwest of Wood Lake, 150 yards east of the South Fork of Elkhorn Creek, and 200 feet west of Redding Road:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam; few fine distinct mottles of light olive brown (2.5Y 5/6) and dark brown (7.5YR 4/2); moderate fine and medium angular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.
A1g—7 to 15 inches; black (10YR 2/1) silty clay loam; few fine distinct light olive brown (2.5Y 5/4), and common fine distinct dark reddish brown (5YR 3/4) mottles; moderate fine and medium angular blocky structure; firm; sticky and plastic; common fine roots; neutral; gradual smooth boundary.

Bg—15 to 36 inches; dark gray (5Y 4/1) silty clay; common fine distinct pale olive (5Y 6/4) and common medium faint dark olive gray (5Y 3/2) mottles; moderate coarse prismatic structure parting to moderate medium blocky; firm; sticky and plastic; few small roots; few fine dark concretions; neutral; gradual smooth boundary.
Cg—36 to 63 inches; dark gray (N 4/1) silty clay; common fine distinct strong brown (7.5YR 5/6) mottles; massive; firm; sticky and plastic; common fine dark concretions; neutral.

The solum ranges from 30 to 50 inches in thickness. The mollic epipedon ranges from 12 to 20 inches in thickness. Bedrock is at a depth of 5 to 10 feet or more. Reaction ranges from medium acid to mildly alkaline throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. A few mottles are in shades of brown or olive.

The Bg horizon has matrix colors of neutral and value of 4 to 6 or hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 or 2. Mottles are in shades of olive, brown, or gray. The Bg horizon ranges from silty clay loam through clay.

The Cg horizon has similar colors and textures as those of the Bg horizon.

Eden Series

The Eden series consists of moderately deep, well drained soils that have slow permeability. These soils formed in residuum derived from calcareous shale, siltstone, and limestone. They are on hillsides and narrow ridgetops. Slopes range from 6 to 35 percent.

Eden soils are associated with Fairmount, Faywood, Lowell, and Nicholson soils. These associated soils are underlain by limestone that is interbedded with thin layers of calcareous shale and siltstone. Lowell soils are deep, Faywood soils are moderately deep, and Fairmount soils are shallow. The moderately well drained Nicholson soils have a fragipan.

Typical pedon of Eden flaggy silty clay, 15 to 35 percent slopes; located in Franklin County, 1.4 miles southwest of Elmville and 415 yards east of the junction of Kentucky Highway 1707 and Union Ridge Road:

Ap—0 to 5 inches; dark grayish brown (2.5Y 4/2) flaggy silty clay; moderate fine granular structure; firm; common fine roots; 18 percent limestone flagstones, 6 to 15 inches across; slightly acid; abrupt smooth boundary.
B2t—5 to 16 inches; light olive brown (2.5Y 5/4) flaggy silty clay; moderate fine and medium angular blocky structure; very firm, sticky and plastic; few fine roots; common thin clay films; 20 percent limestone flagstones, 6 to 15 inches across; mildly alkaline; gradual wavy boundary.
B3—16 to 23 inches; light olive brown (2.5Y 5/4) flaggy silty clay; few fine distinct yellowish brown (10YR 5/6) and few fine faint light yellowish brown mottles; weak medium angular blocky structure; firm, sticky and plastic; common fine roots; 20 percent limestone flagstones, 6 to 15 inches across; mildly alkaline; clear smooth boundary.
Cr1—23 to 45 inches; olive (5Y 5/4) slightly weathered, interbedded, calcareous shale and siltstone and some fractured limestone.
Cr2—45 to 67 inches; interbedded light olive gray (5Y 6/2), soft, calcareous shale, siltstone, and thin bedded hard gray limestone.

The solum ranges from 15 to 30 inches in thickness. Depth to a paralithic contact ranges from 20 to 40 inches. Reaction ranges from strongly acid through moderately alkaline in the solum and mildly alkaline through strongly alkaline in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. It is silty clay or silty clay loam and their flaggy analogues.

The B2t and B3 horizons have hue of 10YR, 2.5Y, or 5Y; value of 4 or 5; and chroma of 3 through 6. The B3 horizon has mottles in shades of brown or gray. It is silty clay or clay and their flaggy analogues.

Elk Series

The Elk series consists of deep, well drained soils that have moderate permeability. These soils formed in mixed alluvium on stream terraces. Slopes range from 2 to 20 percent.

Elk soils are associated on the landscape with Ashton, Lawrence, Otwell, and Nolin soils. Ashton soils have a mollic epipedon. Otwell and Lawrence soils have a fragipan. Otwell soils are moderately well drained, and Lawrence soils are somewhat poorly drained. Nolin soils are on flood plains and lack an argillic horizon.

Typical pedon of Elk silt loam, 2 to 6 percent slopes; located in Franklin County, 3.5 miles north of the Franklin County High School in Frankfort and 0.8 mile east of the junction of U.S. Highway 127 and Tracy Lane:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.
B1—8 to 15 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; very friable; common fine roots; medium acid; gradual smooth boundary.
B21t—15 to 32 inches; brown (7.5YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; medium acid; gradual smooth boundary.

B22t—32 to 46 inches; strong brown (7.5YR 5/6) silty clay loam; few fine faint pale brown mottles; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; few fine dark concretions; medium acid; clear smooth boundary.
IIC—46 to 62 inches; strong brown (7.5YR 5/6) silty clay loam; few fine faint pale brown (10YR 6/3) mottles; massive; firm; common fine dark concretions; medium acid.

The solum ranges from 40 to 54 inches in thickness. Bedrock is at a depth of 5 to 10 feet or more. Except where the soil is limed, reaction ranges from slightly acid through very strongly acid throughout.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam or silty clay loam.

The C horizon has the same color range as that of the B horizon. In places, the C horizon has stratified layers of fine sandy loam, clay loam, or silty clay.

Fairmount Series

The Fairmount series consists of shallow, well drained slowly permeable soils. These soils formed in residuum of limestone interbedded with thin layers of calcareous shale. They are on hillsides, narrow ridges, and bluffs, principally along the Kentucky River and larger streams. Slopes range from 6 to 60 percent.

Fairmount soils are associated with McAfee, Faywood, and Eden soils and Rock outcrop. The associated soils are deeper to bedrock. Eden soils are underlain by calcareous shale, siltstone, and limestone. Eden and Faywood soils lack a mollic epipedon. Limestone outcrops are common on steep and very steep slopes, particularly along the river bluffs.

Typical pedon of Fairmount flaggy silty clay from an area of Fairmount-Rock outcrop complex, 12 to 30 percent slopes; located in Franklin County, 1.25 miles southeast of the junction of Interstate Highway 64 and U.S. Highway 127 in Frankfort, and 0.6 mile east of U.S. Highway 127:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) flaggy silty clay; moderate fine angular blocky structure; firm; many fine roots; 30 percent thin flat limestone flagstones, 6 to 15 inches long; neutral; clear smooth boundary.
B2—10 to 16 inches; brown (10YR 4/3) flaggy clay; moderate fine and medium angular blocky structure; very firm; common fine roots; few fine pores; 30 percent thin flat limestone flagstones, 6 to 15 inches long; neutral; abrupt smooth boundary.
R—16 inches; hard gray limestone.

The thickness of the solum and depth to bedrock are 10 to 20 inches. Reaction ranges from neutral to moderately alkaline throughout. Thin, flat fragments of limestone 1 to 15 inches long, make up about 5 to 35 percent of the volume.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 to 3. It is flaggy silty clay loam or flaggy silty clay.

The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is flaggy silty clay or flaggy clay. Some pedons have few to common mottles in shades of brown, gray, or olive.

Faywood Series

The Faywood series consists of moderately deep, well drained soils that have moderately slow or slow permeability. These soils formed in residuum of limestone interbedded with thin layers of shale and siltstone. Faywood soils are on ridgetops and hillsides. Slopes range from 6 to 30 percent.

Faywood soils are associated with Lowell, Fairmount, McAfee, Eden, and Nicholson soils. Lowell soils are deep, and Fairmount soils are shallow. Eden soils are underlain by calcareous shale interbedded with limestone and siltstone. McAfee soils have reddish matrix colors. The moderately well drained Nicholson soils have a fragipan.

Typical pedon of Faywood silt loam, 6 to 12 percent slopes; located in Franklin County, 1.5 miles southeast of the junction of Interstate Highway 64 and U.S. Highway 127 in Frankfort and 0.75 mile east of U.S. Highway 127:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.
B21t—5 to 21 inches; yellowish brown (10YR 5/6) silty clay; moderate medium subangular blocky structure; very firm, sticky and plastic; common fine roots; thin continuous clay films; few fine dark concretions; medium acid; gradual smooth boundary.
B22t—21 to 34 inches; yellowish brown (10YR 5/6) clay; common fine distinct very pale brown (10YR 7/3) and few fine faint strong brown mottles; moderate medium angular blocky structure; very firm, sticky and plastic; few fine roots; thin continuous clay films in root channels and on ped faces; few small dark concretions; medium acid; abrupt wavy boundary.
R—34 inches; limestone rock.

The thickness of the solum and depth to bedrock are 20 to 40 inches. The solum is 0 to 12 percent flagstones and channery fragments of limestone and shale. Reaction ranges from neutral through strongly acid. Reaction in a few inches above the bedrock may be mildly alkaline.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Except where the soil is severely eroded, the colors are similar to those in the B2t horizon.

The B2t horizon has hue of 7.5YR, 10YR, and 2.5Y; value of 4 to 6; and chroma of 4 through 6. The lower part is commonly mottled in shades of brown or olive. A few pedons are mottled with chroma of 2 below the upper 10 inches of the argillic horizon. The B2t horizon is silty clay, clay, or silty clay loam.

In some pedons, the C horizon has color and texture similar to those in the lower part of the B2t horizon.

Huntington Series

The Huntington series consists of deep, well drained soils that have moderate permeability. These soils formed in alluvium washed from soils that have a limestone origin. Huntington soils are on the flood plains of Elkhorn Creek in Franklin County. Slopes range from 0 to 4 percent.

Huntington soils are associated with Lindside, Newark, Melvin, Boonesboro, and Ashton soils. All the associated soils lack a mollic epipedon, except the Boonesboro and Ashton soils. Lindside soils are moderately well drained, Newark soils are somewhat poorly drained, and Melvin soils are poorly drained. The well drained Boonesboro soils are moderately deep to bedrock. The well drained Ashton soils are on stream terraces.

Typical pedon of Huntington silt loam, occasionally flooded; located in Franklin County, approximately 0.9 mile northwest of Peaks Mill, 700 yards northwest of the junction of Kentucky Highways 1262 and 1707, and 150 feet south of Elkhorn Creek:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam; weak medium granular structure; very friable; many fine roots; slightly acid; gradual smooth boundary.

B1—10 to 22 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; friable; many fine roots; slightly acid; gradual smooth boundary.

B2—22 to 58 inches; brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; slightly firm; few fine roots; slightly acid; gradual smooth boundary.

C—58 to 68 inches; brown (10YR 4/3) sandy clay loam and strata of sandy loam; massive; neutral.

The solum is more than 40 inches thick. The mollic epipedon ranges from 10 to 14 inches in thickness. Reaction ranges from medium acid to mildly alkaline throughout. The solum ranges from 0 to 5 percent coarse fragments; however, generally it is free of coarse fragments.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The C horizon has colors similar to those of the B horizon. It is stratified in places, and textures include sandy clay loam, silt loam, silty clay loam, sandy loam, or gravelly sandy loam.

Lawrence Series

The Lawrence series consists of deep, somewhat poorly drained soils that have a slowly permeable fragipan. These soils formed in mixed alluvium on stream terraces. Slopes range from 0 to 2 percent.

Lawrence soils are associated with Elk, Otwell, and Newark soils. Elk soils lack a fragipan. Otwell soils are moderately well drained. Newark soils lack a fragipan, are somewhat poorly drained, and are on flood plains.

Typical pedon of Lawrence silt loam, rarely flooded; located in Franklin County, 1.75 miles southwest of Swallowfield and 1.4 miles west of the junction of U.S. Highway 127 and McDonald Ferry Road, and 300 yards northeast of the Kentucky River:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

B1—7 to 12 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

B21t—12 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) mottles; weak moderate subangular blocky structure; friable; few fine roots; thin continuous clay films; strongly acid; clear smooth boundary.

B22t—16 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; thin continuous clay films; strongly acid; clear smooth boundary.

Bx1—24 to 36 inches; mottled yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) silty clay loam; moderate very coarse prismatic structure parting to weak medium angular blocky; very firm; compact and brittle; few fine roots between prisms; thin continuous clay films; common fine dark concretions; strongly acid; gradual wavy boundary.

Bx2—36 to 50 inches; mottled strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2) silty clay loam; moderate very coarse prismatic structure parting to weak medium blocky; very firm; compact and brittle; common fine dark concretions; strongly acid; gradual wavy boundary.

B3—50 to 62 inches; brown (7.5YR 4/4) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; moderate medium angular blocky structure; firm; common fine dark concretions; very strongly acid; clear wavy boundary.
IIC—62 to 75 inches; mottled light brownish gray (10YR 6/2), strong brown (7.5YR 5/6), and brown (7.5YR 4/4) fine sand loam; massive; firm; common fine dark concretions; very strongly acid.

The solum ranges from 40 to 80 inches in thickness. The fragipan is at a depth of 18 to 32 inches. Soil reaction is slightly acid to very strongly acid above the fragipan, strongly acid or very strongly acid in the fragipan, and very strongly acid through neutral below the fragipan.

The Ap horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 through 4.

The matrix of the B2t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6. Mottles range from few to many and chroma is 2 or less. The B2t horizon is silt loam or silty clay loam.

Mottles and matrix of the Bx horizon have hue of 7.5YR, 10YR, or 2.5Y; value of 5 through 7; and chroma of 1 through 6. The Bx horizon is silt loam or silty clay loam.

The B3 horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 4 or 6. Mottles are in shades of gray, olive, or brown. The B3 horizon is silt loam or silty clay loam.

The C horizon is mottled in shades of gray or brown. It ranges from fine sandy loam through silty clay.

Lindside Series

The Lindside series consists of deep, moderately well drained soils that have moderate permeability or moderately slow permeability. These soils formed in alluvium washed from soils of limestone origin. They are on flood plains of most major streams. Slopes range from 0 to 2 percent.

Lindside soils are associated with Huntington, Nolin, Newark, Melvin, and Ashton soils. Huntington, Nolin, and Ashton soils are well drained. Huntington soils have a mollic epipedon. Ashton soils have a mollic epipedon and argillic horizon. Newark soils are somewhat poorly drained, and Melvin soils are poorly drained.

Typical pedon of Lindside silt loam, occasionally flooded; in Anderson County, 2.5 miles northwest of the junction of U.S. Highway 127 and Kentucky Highway 151 at Alton, and 1.2 miles south of the junction of Kentucky Highway 151 and Green-Wilson Road, and 135 yards west of South Benson Creek:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; neutral; clear smooth boundary.
B1—7 to 19 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; common fine roots; medium acid; clear wavy boundary.
B2—19 to 28 inches; brown (10YR 4/3) silt loam; few fine distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; medium subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.
B3—28 to 41 inches; brown (10YR 4/3) silt loam; common medium distinct strong brown (7.5YR 5/6) and common medium faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; medium acid; gradual smooth boundary.
C—41 to 67 inches; mottled dark yellowish brown (10YR 4/4), dark grayish brown (10YR 4/2), and grayish brown (10YR 5/2) silty clay loam; massive; firm; common fine dark concretions; slightly acid.

The solum ranges from 30 to 50 inches in thickness. Unless limed, the solum ranges from strongly acid to slightly acid. The C horizon is medium acid to slightly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Mottles that have chroma of 2 or less are at a depth of 14 to 24 inches. The B horizon is silt loam or silty clay loam.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 to 6; and chroma of 1 to 4. In some pedons, the C horizon is weakly stratified loam, fine sandy loam, and silt loam.

Lowell Series

The Lowell series consists of deep, well drained soils that have moderately slow permeability. These soils formed in clayey residuum weathered from limestone interbedded with thin layers of calcareous shale and siltstone. Lowell soils are on ridgetops, shoulder slopes, and hillsides. Slopes range from 2 to 12 percent.

Lowell soils are associated with Faywood, McAfee, Maury, Eden, and Nicholson soils. Faywood and McAfee soils are moderately deep. Maury soils have reddish colors and a thicker argillic horizon than Lowell soils. Eden soils are moderately deep to calcareous shale interbedded with limestone and siltstone. The moderately well drained Nicholson soils have a fragipan.

Typical pedon of Lowell silt loam, 6 to 12 percent slopes; in Franklin County, 1.6 miles south of the junction of Interstate Highway 64 and U.S. Highway 127 in Frankfort, and 560 yards east of the junction of U.S. Highway 127 and Hawkins Lane:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; very friable;

many fine roots; slightly acid; clear smooth boundary.
B1—7 to 12 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky stucture; friable; common fine roots; thin patchy clay films on faces of peds; slightly acid; clear smooth boundary.
B21t—12 to 24 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium angular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; one percent small chert fragments; few fine dark concretions; medium acid; gradual smooth boundary.
B22t—24 to 46 inches; strong brown (7.5YR 5/6) clay; common fine faint brown (10YR 5/3) and yellowish red (5YR 4/6) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak fine and very fine angular blocky structure; very firm; few fine roots; few clay films on faces of peds; few fine dark concretions; 5 percent small chert fragments; 5 percent limestone fragments 1 to 6 inches across; slightly acid.
B3—46 to 57 inches; mottled yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) clay; weak fine and very fine angular blocky structure; very firm; few fine roots; few clay films on faces of peds; few fine dark concretions; 5 percent small chert fragments 1 to 6 inches across; mildly alkaline.
R—57 inches; hard limestone.

The solum ranges from 30 to 60 inches in thickness. Limestone or interbedded limestone, shale, and siltstone bedrock is at a depth of 40 to 80 inches or more. Unless the soil is limed, reaction ranges from slightly acid to very strongly acid to a depth of about 30 inches. Below 30 inches, reaction ranges from strongly acid to mildly alkaline. Immediately above the bedrock, however, reaction ranges from medium acid to mildly alkaline. The upper part of the solum is 0 to 5 percent coarse fragments of limestone or siltstone, and the lower part is 0 to 15 percent.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 4.

The B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is silt loam, silty clay loam, or silty clay.

The B2t horizon has hue of 7.5YR or 10YR in the upper part and 7.5YR, 10YR, or 2.5Y in the lower part. Value is 4 or 5, and chroma is 4 to 6. Most pedons are mottled in the lower part in shades of gray, brown, or red. The B2t horizon is silty clay loam, silty clay, or clay in the upper part and silty clay or clay in the lower part.

The B3 horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 3 to 6. Mottles are in shades of gray and brown. The B3 horizon is silty clay or clay.

Some pedons have a C horizon that has colors and textures like those of the B3 horizon. Others have matrix colors in shades of gray.

Maury Series

The Maury series consists of deep, well drained soils that have moderate permeability to moderately rapid permeability. These soils formed in silty loess and residuum weathered from phosphatic limestone. Maury soils are on broad ridgetops and shoulder slopes. Some areas have a karst topography. Slopes range from 2 to 12 percent.

Maury soils are associated with McAfee, Lowell, and Nicholson soils. McAfee soils are moderately deep. Lowell soils lack the reddish matrix colors and have a thinner argillic horizon. The moderately well drained Nicholson soils have a fragipan.

Typical pedon of Maury silt loam, 2 to 6 percent slopes; in Franklin County, 0.5 mile southeast of Wood Lake and 415 yards southwest of the junction of U.S. Highway 460 and Kentucky Highway 1685:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.
B1—9 to 17 inches; brown (7.5YR 4/4) silt loam; weak fine granular and subangular blocky structure; friable; many fine roots; few small pores; few fine dark concretions; medium acid; clear smooth boundary.
B21t—17 to 25 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular parting to weak very fine angular blocky structure; friable; few fine roots; few fine pores; common clay films on faces of peds; few fine dark concretions; medium acid; clear smooth boundary.
B22t—25 to 34 inches; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure; friable; few fine roots; few fine pores; continuous clay films on faces of peds; comon fine dark concretions; 1 percent small chert fragments; medium acid; gradual smooth boundary.
B23t—34 to 46 inches; yellowish red (5YR 4/6) silty clay; few fine faint light yellowish brown (10YR 6/4) mottles; moderate medium angular blocky structure parting to weak very fine angular blocky; friable; few fine roots; few fine pores; continuous clay films on faces of peds; common fine dark concretions; strongly acid; gradual smooth boundary.
B24t—46 to 64 inches; yellowish red (5YR 4/6) clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium angular blocky structure; very firm, sticky and plastic; continuous clay films on faces of peds; few fine dark concretions; 3 percent small chert fragments; strongly acid.

The solum ranges from 60 inches to about 120 inches in thickness. The argillic horizon ranges from about 50 to 100 inches in thickness. Bedrock is at a depth of 60 to 200 inches or more. In places the B2t horizon and (if

present) the C horizon contain 0 to 5 percent chert fragments less than 3 inches in diameter. The Ap horizon ranges from neutral to strongly acid. The upper part of the B horizon ranges from slightly acid to strongly acid, and the lower part is medium acid to very strongly acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4.

The B1 horizon has hue of 7.5YR or 5YR, value of 4, and chroma of 4. It is silt loam or silty clay loam.

The upper part of the B2t horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 through 6. The lower part has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 8.

Where present, the C horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 through 8. It is clay, silty clay, or silty clay loam.

In some pedons the lower part of the B2t horizon and the C horizon are layered or mottled with hue of 10YR, value of 5 or 6, and chroma of 2 through 6.

McAfee Series

The McAfee series consists of moderately deep, well drained soils that have moderately slow permeability. These soils formed in residuum weathered from phosphatic limestone. McAfee soils are on ridgetops and hillsides. Areas of karst topography are common. Slopes range from 2 to 20 percent.

McAfee soils are associated with Maury, Faywood, Lowell, and Fairmount soils and Rock outcrop. Maury and Lowell soils are deep. Lowell, Maury, and Faywood soils lack a mollic epipedon. The Lowell and Faywood soils lack the reddish matrix colors. Fairmount soils are shallow. Limestone rock outcrops are common on some sloping and stongly sloping soils and, in places, are mapped in complex with the McAfee soils.

Typical pedon of McAfee silt loam, 12 to 20 percent slopes; in Franklin County, 0.7 mile southeast of Woodlake and 0.4 mile south of the junction of U.S. Highway 460 and Kentucky Highway 1685:

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, moderate fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B21t—7 to 14 inches; brown (7.5YR 4/4) silty clay; moderate fine angular blocky structure; firm; many fine roots; common clay films on faces of peds; few fine dark concretions; medium acid; gradual smooth boundary.

B22t—14 to 26 inches; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure; friable; few fine roots; common clay films on faces of peds; few fine dark concretions; 2 percent small chert fragments; medium acid; gradual smooth boundary.

C—26 to 31 inches; reddish brown (5YR 5/4) clay; massive; firm; common fine dark concretions; 7 percent small chert fragments; neutral; abrupt smooth boundary.

R—31 inches; hard limestone bedrock.

The thickness of the solum and depth to bedrock are 20 to 40 inches. Reaction ranges from medium acid to neutral in the solum and from slightly acid to mildly alkaline in the C horizon. The solum is 0 to 15 percent, and the C horizon is 0 to 25 percent fragments of chert up to 3 inches across and fragments of limestone 1 to 6 inches across.

The Ap horizon has hue of 10YR, 7.5YR, or 5YR; value of 3; and chroma of 2 to 4.

The B21t horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam, silty clay, or clay.

The B22t horizon has hue of 7.5YR or 5YR, value of 3 or 4, and chroma of 3 to 6. It is silty clay loam, silty clay, or clay.

Some pedons have a B3 horizon up to 10 inches thick. This B3 horizon has colors like those of the B22t horizon. It is silty clay or clay. Some pedons also have mottles in shades of brown or red.

The C horizon has colors like that of the B22t horizon. In some pedons, it is mottled in shades of gray, brown, or red. It is silty clay or clay.

Melvin Series

The Melvin series consists of deep, poorly drained, moderately permeable soils. These soils formed in mixed alluvium on flood plains along the major streams. Slopes range from 0 to 2 percent.

Melvin soils are associated with Newark, Dunning, Huntington, Nolin, and Lindside soils. Huntington and Nolin soils are well drained, Lindside soils are moderately well drained, and Newark soils are somewhat poorly drained. Dunning and Huntington soils have a mollic epipedon. The fine textured Dunning soils are very poorly drained to poorly drained.

Typical pedon of Melvin silt loam, occasionally flooded; located in Franklin County, 1.75 mile northwest of Franklin County High School and 0.5 miles northeast of the junction of U.S. Highway 127 and Kentucky Highway 1900:

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam; few fine faint yellowish brown and common fine faint light brownish gray mottles; weak fine granular structure; very friable; many fine roots; few fine dark concretions; neutral; clear smooth boundary.

B2g—8 to 28 inches; light brownish gray (2.5Y 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct dark grayish brown (2.5Y 4/2) mottles; weak fine subangular blocky structure; friable; common fine roots; few fine dark concretions; neutral; gradual smooth boundary.

Cg—28 to 65 inches; light olive gray (5Y 6/2) silt loam; many fine prominent yellowish brown (10YR 5/6), many fine distinct reddish brown (5YR 4/4), and few fine faint pale olive mottles; structureless; friable; weakly stratified in lower part; few fine dark concretions; neutral.

The solum ranges from 20 to 40 inches in thickness. Bedrock is at a depth of more than 60 inches. Concretions range from 0 to 2 percent. Reaction ranges from slightly acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 to 3.

The B2g horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 or 2. Mottles are in shades of brown, olive, or gray. The B2g horizon is silt loam or silty clay loam.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y; vaue of 4 through 6; and chroma of 1 or 2. Mottles are in shades of brown, olive, or gray. The Cg horizon is silt loam or silty clay loam. Some pedons have stratified layers of loam, fine sandy loam, silty clay loam, or silty clay below a depth of 40 inches.

Newark Series

The Newark series consists of deep, somewhat poorly drained, moderately permeable soils. These soils formed in mixed alluvium on flood plains along most major streams. Slopes range from 0 to 2 percent.

Newark soils are associated with Melvin, Huntington, Nolin, Dunning, Lawrence, and Lindside soils. Huntington and Nolin soils are well drained. Melvin soils are poorly drained, and Lindside soils are moderately well drained. Dunning and Huntington soils have a mollic epipedon, and Lawrence soils have a fragipan. The fine textured Dunning soils are very poorly drained to poorly drained.

Typical pedon of Newark silt loam, occasionally flooded; located in Franklin County, 0.9 mile north of Peaks Mill, and 500 yards east of the junction of Kentucky Highways 1262 and 1707.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

B21—9 to 16 inches; brown (10YR 5/3) silt loam; common fine faint light brownish gray and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

B22g—16 to 32 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; common fine roots; slightly acid; gradual smooth boundary.

C1g—32 to 50 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6), few fine faint grayish brown and common medium faint light gray (10YR 7/2) mottles; massive; friable; few fine dark concretions; few small flakes of mica; slightly acid; gradual smooth boundary.

C2g—50 to 64 inches; mottled light brownish gray (2.5Y 6/2), gray (10YR 5/1), yellowish brown (10YR 5/6), and brown (10YR 5/3) silt loam; massive; friable; few fine dark concretions; few small mica flakes; slightly acid.

The solum ranges from 22 to 40 inches in thickness. Reaction ranges from medium acid to mildly alkaline throughout. Below a depth of 30 inches, the solum is 0 to 15 percent, by volume, coarse fragments, that are mostly pebbles.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The B21 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Mottles are in shades of gray or brown. The B21 horizon is silt loam or silty clay loam.

The B22g horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of brown. The B22g horizon is silt loam or silty clay loam.

The C1g has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of gray, olive, and brown. The C1g horizon is silt loam or silty clay loam.

The mottled C2g horizon has colors that range from brown through gray. It is silt loam or silty clay loam.

Nicholson Series

The Nicholson series consists of deep, moderately well drained soils that have a slowly permeable fragipan. These soils formed in a mantle of silty loess underlain by residuum of limestone, calcareous shale, and siltstone. They are on ridgetops. Slopes range from 2 to 6 percent.

Nicholson soils are associated with Lowell, Faywood, Maury, and Eden soils. All the associated soils are well drained and fine textured and lack a fragipan. Eden and Faywood soils are moderately deep.

Typical pedon of Nicholson silt loam, 2 to 6 percent slopes; in Anderson County, 2.3 miles west of Avonstoke, 0.6 mile south of the junction of Kentucky Highway 1472 and the Southern Railroad, and 300 yards east of the Shelby County line.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam, weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

B21t—7 to 21 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many small roots; common thin clay films on faces of peds; few fine dark concretions; very strongly acid; gradual smooth boundary.

B22t—21 to 27 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few small roots; common clay films on faces of peds; few fine dark concretions; medium acid; gradual wavy boundary.

Bx—27 to 39 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; moderate very coarse prismatic structure parting to weak medium angular blocky; firm, compact and brittle; few small roots; prisms are coated with light brownish gray (10YR 6/2) silty clay; common clay films on faces of blocks; common fine dark concretions; very strongly acid; gradual wavy boundary.

IIB3—39 to 48 inches; yellowish brown (10YR 5/6) silty clay; common medium distinct strong brown (7.5YR 5/8), light gray (10YR 7/1) and few fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium angular blocky structure; firm, sticky and plastic; common clay films on faces of peds; common dark brown concretions; strongly acid; gradual wavy boundary.

IIC—48 to 62 inches; dark yellowish brown (10YR 4/6) silty clay; common medium distinct light brownish gray (10YR 6/2) and light gray (10YR 7/1) mottles; massive, very firm, sticky and plastic; strongly acid.

The solum ranges from 40 to 80 inches in thickness. Bedrock is at a depth of 48 to 100 inches. The fragipan is at a depth of 18 to 30 inches. Except where limed, the soil ranges from very strongly acid to medium acid through the fragipan. Below the fragipan, reaction ranges from strongly acid to mildly alkaline.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. Some pedons have a thin B1 horizon that is silt loam or silty clay loam.

The Bx horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 3 to 5; chroma of 4 to 8. Mottles range from few to many and have chroma of 2 or less. The Bx horizon is silt loam or silty clay loam and is firm or very firm.

The IIB3 horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y; value of 4 or 5; chroma of 4 to 6. Mottles are few or common and have chroma of 2 or less. The IIB3 horizon is silty clay or clay.

The IIC horizon has the same range of color and texture as those of the IIB3 horizon. It is 0 to 15 percent coarse fragments.

Nolin Series

The Nolin series consists of deep, well drained soils that have moderate permeability. These soils formed in mixed alluvium on the flood plains of all the major streams, except Elkhorn Creek in Franklin County. Slopes range from 0 to about 2 percent.

Nolin soils are associated with Lindside, Newark, and Melvin soils. Melvin soils are poorly drained, Newark soils are somewhat poorly drained, and Lindside soils are moderately well drained.

Typical pedon of Nolin silt loam, occasionally flooded; in Anderson County, 1.7 miles west of Glensboro, 300 yards south of Kentucky Highway 44, and 250 feet north of Salt River:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak, fine and medium subangular blocky structure; friable; common fine roots; slightly acid; gradual smooth boundary.

B21—9 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; weak, fine and medium subangular blocky structure; friable; common fine roots; 3 percent small limestone fragments; slightly acid; gradual smooth boundary.

B22—26 to 57 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; few fine distinct grayish brown (10YR 5/2) mottles; few fine dark concretions below a depth of 30 inches; 3 percent small limestone fragments; slightly acid; gradual smooth boundary.

C—57 to 64 inches; brown (10YR 4/3) silt loam and strata of fine sandy loam; massive; friable; 4 percent small pebbles and small rock fragments; slightly acid.

The solum is more than 40 inches thick. Bedrock is at a depth of about 5 feet to more than 20 feet. The solum is 0 to 5 percent gravel. Reaction ranges from medium acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3.

The B2 horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5, and chroma of 3 or 4. Some pedons are mottled in shades of gray below a depth of 24 inches.

The C horizon has hue of 7.5YR, 10YR, and 2.5Y; value of 4 or 5; and chroma of 2 to 4. It is mostly silt loam but commonly has thin strata of coarser textures. The C horizon is 0 to 20 percent gravel.

Otwell Series

The Otwell series consists of deep, moderately well drained soils that have a very slowly permeable fragipan. These soils formed in mixed alluvium on stream terraces. Slopes range from 0 to 6 percent.

Otwell soils are associated with Ashton, Elk, and Lawrence soils. Ashton and Elk soils lack a fragipan and are well drained. Lawrence soils are somewhat poorly drained.

Typical pedon of Otwell silt loam, rarely flooded, 2 to 6 percent slopes; in Franklin County, 1.4 miles southwest

of Evergreen, 1.2 miles northeast of the junction of Kentucky Highway 151 and Green Wilson Road, and 0.6 mile southeast of Benson Road:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; many fine roots; slightly acid; gradual smooth boundary.

B1—7 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; strongly acid; gradual smooth boundary.

B2t—13 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; common fine roots; strongly acid; gradual wavy boundary.

Bx1—24 to 32 inches; yellowish brown (10YR 5/4) silt loam; moderate very coarse prismatic structure parting to weak medium angular blocky; common medium distinct light brownish gray (10YR 6/2) and common medium prominent strong brown (7.5YR 5/8) mottles; firm, brittle and compact; few small roots along prism faces; few fine dark concretions; strongly acid; abrupt wavy boundary.

Bx2—32 to 58 inches; mottled grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) silty clay loam; moderate very coarse prismatic structure parting to weak medium angular blocky; firm, brittle and compact; very strongly acid; abrupt wavy boundary.

IIB3—58 to 70 inches; mottled strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) silty clay loam that has thin strata of silt loam; weak medium and coarse subangular blocky structure; firm; 5 percent weathered chert fragments and pebbles; strongly acid.

The thickness of the solum is 40 to 72 inches, and the depth to bedrock ranges from 5 feet to more than 10 feet. Except where the soil is limed, reaction is strongly acid or very strongly acid through the fragipan and medium acid or strongly acid below the fragipan.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The B1 and B2 horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They are silt loam or silty clay loam.

The Bx horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 to 7; and chroma of 2 to 6. Some pedons are mottled equally with shades of gray and brown. The Bx horizon is silt loam or silty clay loam. The upper part is 0 to 5 percent chert fragments, and the lower part is 0 to 10 percent chert fragments.

The IIB3 horizon has similar colors as those of the Bx horizon. It has 0 to 5 percent coarse fragments, which are mostly gravel. It is stratified silty clay loam, silt loam, and thin layers of silty clay.

Some pedons have a C horizon that has stratified textures similar to those of the IIB3 horizon. Generally, most pedons that have a C horizon have a higher percentage of coarse fragments.

Formation of the Soils

This section discusses the factors of soil formation, relates them to soils in the survey area, and explains the processes of soil formation.

Factors of Soil Formation

The characteristics of a soil at any given point depend on the physical and chemical composition of parent material and on climate, relief, plant and animal life, and time. Soils form by the interaction of these five factors. The relative importance of each factor differs from one soil to another. In some areas one factor may dominate the formation of soil characteristics, and in other areas another factor may dominate. In Anderson and Franklin Counties, climate and plant and animal life are not likely to vary greatly, but there are differences in relief and parent material.

Because the interrelationships between the five factors are so complex, the effect of any one factor is hard to determine.

The following is a brief discussion of some of the ways in which these factors have influenced soil formation in Anderson and Franklin Counties.

Parent Material

Parent material is the soft, unconsolidated mass in which soils form. It influences the mineral and chemical composition of the soil and, to a large extent, the rate at which soil formation takes place. In Anderson and Franklin Counties the soils formed in parent material derived from the weathering or decomposition of rocks and minerals of the Ordovician System. This parent material occurs in the form of residuum, material that weathered in place; alluvium, material that washed from soils and was deposited by water; and loess, material that was deposited by wind.

Eden soils formed in residuum of mainly calcareous shale that has thin layers of limestone and siltstone. They are on uplands. Fairmount, Faywood, Lowell, Maury, and McAfee soils formed mainly in material weathered from limestone. All of these soils are clayey in the lower part of the B horizon and in the C horizon.

Some soils, such as Nicholson soils, formed in a thin mantle of loess over limestone residuum. The upper part of the solum, which formed in loess, is silty. The lower part, which formed in residuum, is clayey.

Ashton, Elk, Lawrence, and Otwell soils formed in old alluvium on stream terraces. Boonesboro, Huntington, Lindside, Melvin, Newark, and Nolin soils formed in more recent alluvium on flood plains. All of these soils have less clay in the B and C horizons than soils that formed in residuum.

Climate

The climate of Anderson and Franklin Counties is humid temperate. The average precipitation is 46 inches. The soils are never completely dry. They are subject to leaching throughout most of the year. The average summer air temperature is 74 degrees F and the average winter air temperature is 34 degrees F.

The soils in Anderson and Franklin Counties that best show the influence of climate have a leached, acid Bt horizon that is finer textured than the surface layer. The well drained Lowell soils are an example. For more detailed information on climate, see the section "General Nature of the Survey Area."

Relief

Relief, or the position, shape, and slope of the landscape, influences the formation of soils mainly by its effect on drainage and erosion. Relief also influences the formation of soils by variations in exposure to sun, wind, air, drainage, and plant cover.

A considerable amount of water runs off the moderately steep and steep soils, such as Eden and Fairmount soils. Less water is able to enter the soils. As a result the soils are eroded more rapidly, and deep soils generally do not form.

On gently sloping and sloping soils, such as Lowell and Maury soils, enough water moves downward to cause leaching and a pronounced accumulation of clay in the subsoil. These soils are likely to be deep and to have well defined profiles.

On nearly level soils, such as Melvin and Newark soils, most of the water is absorbed, but wetness becomes a problem. Water does not drain off easily.

Plant and Animal Life

Plants affect soil formation mostly by adding organic matter to the soil. Earthworms, ants, and burrowing animals mix the soil and add organic matter. They also make soils more open and porous, which affects soil

structure. Bacteria and fungi contribute mainly by helping to decompose organic matter and releasing nutrients for plants. The organic matter imparts a dark color to the soil material and affects soil structure.

The vegetation that grows on the soil during the period of soil formation influences the type of soil that forms. In Anderson and Franklin Counties, the native vegetation was mostly hardwood forest. Soils which form under hardwood forest are characterized by a thin, dark surface layer; a leached, lighter colored subsurface layer; and a brighter colored subsoil.

Man greatly altered the surface layer and changed the soil environment where he cleared the forest and plowed the soil. He has mixed the soil layers, moved soil from place to place, added fertilizer and lime, and introduced new plants. In places, accelerated erosion has removed most of the original surface layer and exposed the subsoil.

Time

A long period of time is required for distinct soil profiles to develop. The length of time required depends mainly on the nature of the parent material and the topography. With the exception of soils formed in recent alluvium, enough time has elapsed for the soils in Anderson and Franklin Counties to express the interaction of the factors of soil formation.

Soils formed in recent alluvium have weak horizon development. The surface horizon may show a slight increase in the organic matter content, and the subsoil may have weak structure. Such soils are said to be immature; examples are Nolin and Newark soils. After a long period of time, if there is no further deposition of sediment, weathering occurs. Some of the finer material is leached into the subsoil, and the structure and color of the subsoil may change. Ashton and Elk soils are examples of this maturing process. A soil is said to be mature when it has been in place long enough to acquire distinct profile characteristics. Examples of mature soils are Lowell and Maury soils.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	Less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. These include no tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and

resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion. *Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They

have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slope, gradient. Terms used in this survey to describe the range of slopes are:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Strongly sloping	12 to 20 percent
Moderately steep	20 to 30 percent
Steep	30 to 50 percent
Very steep	more than 50 percent

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-79 at Frankfort, Ky.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	41.2	21.0	31.1	69	-7	15	3.31	1.67	4.74	7	3.7
February	44.9	23.1	34.0	72	-2	13	3.01	1.35	4.42	6	3.1
March	54.1	31.0	42.6	80	12	54	4.49	2.19	6.48	8	1.9
April	66.5	40.8	53.7	86	24	144	4.00	2.24	5.55	8	.0
May	75.8	50.4	63.1	91	32	412	4.16	2.76	5.43	8	.0
June	83.8	59.6	71.7	96	45	651	3.79	2.24	5.17	7	.0
July	87.6	63.5	75.6	98	51	794	4.31	2.61	5.83	7	.0
August	86.7	62.1	74.4	97	49	756	3.23	1.81	4.49	6	.0
September	81.2	55.2	68.2	96	38	546	3.59	1.39	5.43	5	.0
October	69.8	42.2	56.0	89	25	220	2.46	1.04	3.65	5	.0
November	56.2	33.1	44.7	81	12	27	3.31	1.76	4.66	7	.6
December	45.5	25.4	35.5	70	2	13	3.45	1.70	4.95	7	1.3
Yearly:											
Average	66.1	42.3	54.2	---	---	---	---	---	---	---	---
Extreme	---	---	---	100	-9	---	---	---	---	---	---
Total	---	---	---	---	---	3,645	43.11	36.61	49.36	81	10.6

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-79 at Frankfort, Ky.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 8	April 17	May 5
2 years in 10 later than--	April 2	April 13	May 1
5 years in 10 later than--	March 22	April 6	April 22
First freezing temperature in fall:			
1 year in 10 earlier than--	October 28	October 20	October 9
2 years in 10 earlier than--	November 2	October 23	October 13
5 years in 10 earlier than--	November 11	October 31	October 21

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-79 at Frankfort, Ky.]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	216	192	163
8 years in 10	222	197	169
5 years in 10	233	207	182
2 years in 10	244	216	194
1 year in 10	250	222	200

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Anderson County	Franklin County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
AsA	Ashton silt loam, rarely flooded, 0 to 2 percent slopes	350	1,020	1,370	0.5
AsB	Ashton silt loam, rarely flooded, 2 to 6 percent slopes	0	1,760	1,760	0.7
Bo	Boonesboro silt loam, occasionally flooded	2,150	3,020	5,170	1.9
Du	Dunning silty clay loam, occasionally flooded	10	450	460	0.2
EdC	Eden silty clay loam, 6 to 15 percent slopes	7,310	10,720	18,030	6.8
EfE	Eden flaggy silty clay, 15 to 35 percent slopes	52,950	35,440	88,390	33.1
EkB	Elk silt loam, 2 to 6 percent slopes	1,110	3,840	4,950	1.9
EkC	Elk silt loam, 6 to 12 percent slopes	1,250	3,040	4,290	1.6
EkD	Elk silt loam, 12 to 20 percent slopes	90	380	470	0.2
ElB	Elk silt loam, rarely flooded, 2 to 6 percent slopes	1,400	2,690	4,090	1.5
ElC	Elk silt loam, rarely flooded, 6 to 12 percent slopes	250	1,210	1,460	0.5
FaC	Fairmount flaggy silty clay, 6 to 12 percent slopes	2,500	490	2,990	1.1
FcE	Fairmount-Rock outcrop complex, 12 to 30 percent slopes	4,570	3,530	8,100	3.0
FcF	Fairmount-Rock outcrop complex, 30 to 60 percent slopes	2,810	6,490	9,300	3.5
FdC	Faywood silt loam, 6 to 12 percent slopes	14,980	8,930	23,910	9.0
FdD	Faywood silt loam, 12 to 30 percent slopes	11,870	7,420	19,290	7.2
FeC3	Faywood silty clay, 6 to 12 percent slopes, severely eroded	440	110	550	0.2
Hu	Huntington silt loam, occasionally flooded	0	1,680	1,680	0.6
Lc	Lawrence silt loam, rarely flooded	580	630	1,210	0.5
Ld	Lindside silt loam, occasionally flooded	1,160	1,110	2,270	0.9
LwB	Lowell silt loam, 2 to 6 percent slopes	5,440	5,780	11,220	4.2
LwC	Lowell silt loam, 6 to 12 percent slopes	11,980	8,040	20,020	7.5
MaB	Maury silt loam, 2 to 6 percent slopes	360	5,460	5,820	2.2
MaC	Maury silt loam, 6 to 12 percent slopes	170	2,490	2,660	1.0
McB	McAfee silt loam, 2 to 6 percent slopes	90	1,150	1,240	0.5
McC	McAfee silt loam, 6 to 12 percent slopes	800	5,350	6,150	2.3
McD	McAfee silt loam, 12 to 20 percent slopes	760	3,190	3,950	1.5
MdD	McAfee-Rock outcrop complex, 6 to 20 percent slopes	90	440	530	0.2
Me	Melvin silt loam, occasionally flooded	40	410	450	0.2
Ne	Newark silt loam, occasionally flooded	430	720	1,150	0.4
NhB	Nicholson silt loam, 2 to 6 percent slopes	1,900	3,260	5,160	1.9
No	Nolin silt loam, occasionally flooded	2,600	1,800	4,400	1.6
OtA	Otwell silt loam, rarely flooded, 0 to 2 percent slopes	90	170	260	0.1
OtB	Otwell silt loam, rarely flooded, 2 to 6 percent slopes	390	1,340	1,730	0.6
	Water	920	1,480	2,400	0.9
	Total	131,840	135,040	266,880	100.0

TABLE 5.--CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Capability subclass	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Tons	AUM*
AsA---------- Ashton	I	140	3,200	50	45	5.0	9.5
AsB---------- Ashton	IIe	130	3,000	45	45	5.0	9.5
Bo---------- Boonesboro	IIs	100	2,800	40	40	3.5	6.0
Du---------- Dunning	IIIw	110	---	---	40	3.5	8.0
EdC---------- Eden	IIIe	80	2,300	30	25	3.0	6.0
EfE---------- Eden	VIe	---	---	---	---	---	4.0
EkB---------- Elk	IIe	125	3,000	45	45	4.5	9.0
EkC---------- Elk	IIIe	110	2,800	40	35	4.0	8.0
EkD---------- Elk	IVe	90	2,400	35	30	3.5	7.0
ElB---------- Elk	IIe	125	3,000	45	45	4.5	9.0
ElC---------- Elk	IIIe	110	2,800	40	35	4.0	8.0
FaC---------- Fairmount	VIe	---	---	---	---	---	4.0
FcE---------- Fairmount-Rock outcrop	VIs	---	---	---	---	---	---
FcF---------- Fairmount-Rock outcrop	VIIs	---	---	---	---	---	---
FdC---------- Faywood	IIIe	80	2,000	20	25	3.0	6.0
FdD---------- Faywood	VIe	---	---	---	---	---	4.0
FeC3---------- Faywood	IVe	---	1,800	---	---	2.5	4.5
Hu---------- Huntington	IIw	130	3,000	50	45	4.5	9.0
Lc---------- Lawrence	IIIw	80	1,700	---	35	30	5.5
Ld---------- Lindside	IIw	115	2,800	45	45	4.5	8.5
LwB---------- Lowell	IIe	110	2,900	40	35	4.0	8.0

See footnote at end of table.

TABLE 5.--CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Capability subclass	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Tons	AUM*
LwC--Lowell	IIIe	100	2,600	35	30	3.5	8.0
MaB--Maury	IIe	125	3,200	50	40	4.5	9.0
MaC--Maury	IIIe	115	3,000	45	35	4.0	8.0
McB--McAfee	IIe	100	2,600	30	30	3.5	7.0
McC--McAfee	IIIe	95	2,200	25	---	3.0	6.5
McD--McAfee	IVe	60	---	---	---	2.5	5.5
MdD--McAfee-Rock outcrop	VIs	---	---	---	---	---	---
Me--Melvin	IIIw	80	---	---	35	3.5	7.0
Ne--Newark	IIw	105	2,500	40	40	4.0	8.5
NhB--Nicholson	IIe	120	2,800	40	40	3.5	7.0
No--Nolin	IIw	130	3,000	50	45	4.5	9.0
OtA--Otwell	IIw	105	2,800	40	37	3.4	6.8
OtB--Otwell	IIe	110	2,800	40	37	3.4	6.8

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Anderson County	350	---	---	---
Franklin County	1,020	---	---	---
II:				
Anderson County	17,120	10,690	4,280	2,150
Franklin County	33,780	25,280	5,480	3,020
III:				
Anderson County	30,060	29,430	630	---
Franklin County	30,550	29,060	1,490	---
IV:				
Anderson County	8,600	8,600	---	---
Franklin County	14,400	14,400	---	---
V:				
Anderson County	---	---	---	---
Franklin County	---	---	---	---
VI:				
Anderson County	71,980	67,320	---	4,660
Franklin County	47,320	43,350	---	3,970
VII:				
Anderson County	2,810	---	---	2,810
Franklin County	6,490	---	---	6,490
VIII:				
Anderson County	---	---	---	---
Franklin County	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
AsA, AsB---------- Ashton	1o	Slight	Slight	Slight	Severe	White oak----------	---	Eastern white pine, yellow-poplar, black walnut, sweetgum, eastern cottonwood, cherrybark oak, pin oak, white ash, American sycamore.
						Pin oak----------	95	
						Yellow-poplar-------	---	
						Sweetgum----------	77	
						Shumard oak---------	94	
						American sycamore---	---	
Bo---------- Boonesboro	1o	Slight	Slight	Slight	Severe	Northern red oak----	85	Eastern cottonwood, sweetgum, northern red oak, yellow-poplar, white ash, American sycamore.
						Yellow-poplar-------	---	
						White oak----------	---	
						Sweetgum----------	---	
						White ash----------	---	
Du---------- Dunning	1w	Slight	Moderate	Severe	Severe	Pin oak----------	95	Pin oak, baldcypress, swamp white oak, American sycamore.
						Sweetgum----------	95	
						Eastern cottonwood--	---	
EdC---------- Eden	3c	Slight	Moderate	Moderate	Moderate	Eastern redcedar----	44	Black oak, white oak, white ash.
						Scarlet oak---------	71	
						White ash----------	---	
						Chinkapin oak-------	---	
EfE---------- Eden (North aspect)	3c	Moderate	Moderate	Moderate	Moderate	Eastern redcedar----	44	Black oak, white oak, white ash.
						Scarlet oak---------	71	
						White ash----------	---	
						Chinkapin oak-------	---	
EfE---------- Eden (South aspect)	4c	Moderate	Moderate	Moderate	Slight	Eastern redcedar----	39	Eastern redcedar, white oak, Virginia pine, black oak.
						Scarlet oak---------	68	
						White oak----------	---	
						American elm--------	---	
						Hickory------------	---	
EkB, EkC, ElB, ElC Elk	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Eastern white pine, American sycamore, yellow-poplar, black walnut, black oak, eastern cottonwood, white oak, northern red oak, shortleaf pine, sweetgum, white ash.
						Yellow-poplar-------	90	
						Red maple----------	---	
						Hackberry----------	---	
EkD---------- Elk	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Eastern white pine, American sycamore, yellow-poplar, black walnut, black oak, eastern cottonwood, white oak, northern red oak, shortleaf pine, sweetgum, white ash.
						Yellow-poplar-------	90	
						Red maple----------	---	
						Hackberry----------	---	
FaC---------- Fairmount	5d	Slight	Moderate	Moderate	Slight	Black oak----------	---	Black oak, white oak, Virginia pine, eastern white pine.
						Eastern redcedar----	---	
						Scarlet oak---------	---	
						White oak----------	---	
						Chinkapin oak-------	---	
						Hickory------------	---	

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
FcE*: Fairmount	5d	Moderate	Moderate	Moderate	Slight	Black oak	---	Black oak, white oak, Virginia pine, eastern white pine.
						Eastern redcedar	---	
						Scarlet oak	---	
						White oak	---	
						Chinkapin oak	---	
						Hickory	---	
Rock outcrop.								
FcF*: Fairmount	5d	Severe	Severe	Moderate	Slight	Black oak	---	Black oak, white oak, Virginia pine, eastern white pine.
						Eastern redcedar	---	
						Scarlet oak	---	
						White oak	---	
						Chinkapin oak	---	
						Hickory	---	
Rock outcrop.								
FdC Faywood	3c	Slight	Moderate	Slight	Moderate	Sugar maple	---	Black oak, white oak, white ash, eastern white pine.
						Northern red oak	70	
						Eastern white pine	76	
						White oak	58	
						White ash	---	
						Chinkapin oak	---	
FdD Faywood	3c	Moderate	Moderate	Slight	Moderate	Northern red oak	70	Black oak, white oak, white ash, eastern white pine.
						Eastern white pine	76	
						Sugar maple	---	
						White oak	---	
						White ash	---	
						Chinkapin oak	---	
FeC3 Faywood	4c	Slight	Moderate	Moderate	Slight	Northern red oak	60	Virginia pine, eastern redcedar, white oak, black oak.
						White oak	---	
						Chinkapin oak	---	
Hu Huntington	1o	Slight	Slight	Slight	Severe	Yellow-poplar	---	Yellow-poplar, black walnut, American sycamore, eastern white pine, northern red oak, shortleaf pine, white ash.
						Northern red oak	---	
Lc Lawrence	2w	Slight	Moderate	Slight	Severe	Northern red oak	65	Yellow-poplar, white ash, black oak, white oak, American sycamore, sweetgum, willow oak, southern red oak.
						Yellow-poplar	86	
						Sweetgum	87	
						Black oak	78	
						White oak	74	
						Southern red oak	---	
Ld Lindside	1o	Slight	Slight	Slight	Severe	Northern red oak	86	Eastern white pine, white oak, yellow-poplar, black walnut, white ash, black oak, northern red oak, shortleaf pine.
						Yellow-poplar	95	
						Black walnut	---	
						White ash	85	
						White oak	85	
						Red maple	---	
						Black walnut	---	
						Black oak	85	
						Black locust	78	
LwB, LwC Lowell	2c	Slight	Slight	Slight	Moderate	Northern red oak	70	Yellow-poplar, eastern white pine, white ash, black oak, northern red oak, white oak.
						Black cherry	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
MaB, MaC---------- Maury	2o	Slight	Slight	Slight	Moderate	Black walnut-------- Black locust-------- White ash---------- Bur oak---------- Black cherry-------- Hackberry----------	--- --- --- --- --- ---	Black walnut, yellow-poplar, white ash, white oak, eastern white pine, black oak, northern red oak.
McB, McC---------- McAfee	3c	Slight	Moderate	Slight	Moderate	Northern red oak---- Eastern redcedar---- Yellow-poplar------- Black locust-------- Persimmon---------- Black walnut--------	79 50 85 --- --- ---	White oak, eastern white pine, black oak, yellow-poplar, northern red oak.
McD---------- McAfee	3c	Moderate	Moderate	Slight	Moderate	Northern red oak---- Eastern redcedar---- Yellow-poplar------- Black locust-------- Persimmon---------- Black walnut--------	79 50 85 --- --- ---	White oak, eastern white pine, black oak, yellow-poplar, northern red oak.
MdD*: McAfee----------	3c	Moderate	Moderate	Slight	Moderate	Northern red oak---- Eastern redcedar---- Yellow-poplar------- Black locust-------- Persimmon---------- Black walnut--------	79 50 85 --- --- ---	White oak, eastern white pine, black oak, yellow-poplar, northern red oak.
Rock outcrop.								
Me---------- Melvin	1w	Slight	Severe	Severe	Severe	Pin oak---------- Cottonwood---------- Sweetgum---------- Hickory----------	101 100 --- ---	Pin oak, American sycamore, sweetgum, baldcypress, willow oak.
Ne---------- Newark	1w	Slight	Moderate	Slight	Severe	Pin oak---------- Eastern cottonwood-- Yellow-poplar------- Sweetgum----------	99 94 --- 88	Eastern cottonwood, sweetgum, American sycamore, eastern white pine.
NhB---------- Nicholson	2o	Slight	Slight	Slight	Moderate	Yellow-poplar------- Northern red oak---- Black oak---------- White oak---------- Hickory---------- Sweetgum----------	--- 80 76 71 --- ---	Black oak, yellow-poplar, white oak, eastern white pine, sweetgum, northern red oak.
No---------- Nolin	1o	Slight	Slight	Slight	Severe	Sweetgum---------- Yellow-poplar------- Eastern cottonwood-- American sycamore--- River birch---------	92 107 --- --- ---	Black walnut, eastern cottonwood, northern red oak, sweetgum, white ash, yellow-poplar.
OtA, OtB---------- Otwell	3o	Slight	Slight	Slight	Moderate	Southern red oak---- Black oak---------- White oak---------- Yellow-poplar------- Sugar maple--------- Blackgum----------	--- --- 70 --- --- ---	Eastern white pine, black oak, white oak, white ash, shortleaf pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AsA---------- Ashton	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
AsB---------- Ashton	Severe: flooding.	Slight----------	Moderate: slope.	Slight----------	Slight.
Bo---------- Boonesboro	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding, thin layer.
Du---------- Dunning	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
EdC---------- Eden	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, slope.
EfE---------- Eden	Severe: slope.	Severe: slope.	Severe: slope, too clayey, small stones.	Severe: slope.	Severe: slope.
EkB---------- Elk	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
EkC---------- Elk	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
EkD---------- Elk	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ElB---------- Elk	Severe: flooding.	Slight----------	Moderate: slope.	Slight----------	Slight.
ElC---------- Elk	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
FaC---------- Fairmount	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Severe: erodes easily.	Severe: large stones, thin layer.
FcE*: Fairmount----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: large stones, slope, small stones.	Severe: erodes easily.	Severe: large stones, slope, thin layer.
Rock outcrop.					
FcF*: Fairmount----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: large stones, slope, small stones.	Severe: erodes easily, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FdC---------- Faywood	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
FdD---------- Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
FeC3---------- Faywood	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
Hu---------- Huntington	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
Lc---------- Lawrence	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
Ld---------- Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: flooding.
LwB---------- Lowell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
LwC---------- Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MaB---------- Maury	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
MaC---------- Maury	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
McB---------- McAfee	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight----------	Moderate: thin layer.
McC---------- McAfee	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
McD---------- McAfee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MdD*: McAfee----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Rock outcrop.					
Me---------- Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ne---------- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
NhB---------- Nicholson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
No---------- Nolin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
OtA, OtB---------- Otwell	Severe: flooding, percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AsA, AsB---------- Ashton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Bo---------- Boonesboro	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Du---------- Dunning	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
EdC---------- Eden	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EfE---------- Eden	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EkB---------- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EkC, EkD---------- Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ElB---------- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ElC---------- Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FaC---------- Fairmount	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
FcE*: Fairmount---------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
FcF*: Fairmount---------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
FdC---------- Faywood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FdD---------- Faywood	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FeC3---------- Faywood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hu---------- Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Lc---------- Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ld---------- Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
LwB---------- Lowell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
LwC---------- Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MaB---------- Maury	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC---------- Maury	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
McB---------- McAfee	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
McC---------- McAfee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
McD---------- McAfee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MdD*: McAfee----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
Me---------- Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ne---------- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NhB---------- Nicholson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
No---------- Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OtA, OtB---------- Otwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AsA, AsB---------- Ashton	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
Bo---------- Boonesboro	Severe: depth to rock.	Severe: flooding.	Severe: flooding, depth to rock.	Severe: flooding.	Severe: flooding.	Moderate: flooding, thin layer.
Du---------- Dunning	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
EdC---------- Eden	Moderate: too clayey.	Moderate: shrink-swell, large stones, slope.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
EfE---------- Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
EkB---------- Elk	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
EkC---------- Elk	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
EkD---------- Elk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
ElB---------- Elk	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
ElC---------- Elk	Moderate: slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: low strength.	Moderate: slope.
FaC---------- Fairmount	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, low strength.	Severe: large stones, thin layer.
FcE*, FcF*: Fairmount--------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.						
FdC---------- Faywood	Severe: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
FdD---------- Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
FeC3---------- Faywood	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Hu---------- Huntington	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Lc---------- Lawrence	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength.	Moderate: wetness.
Ld---------- Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
LwB---------- Lowell	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
LwC---------- Lowell	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
MaB---------- Maury	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
MaC---------- Maury	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
McB---------- McAfee	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer.
McC---------- McAfee	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
McD---------- McAfee	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MdD*: McAfee----------	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Rock outcrop.						
Me---------- Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Ne---------- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
NhB---------- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
No---------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
OtA---------- Otwell	Moderate: too clayey, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength,	Slight.
OtB---------- Otwell	Moderate: too clayey, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Map symbpl and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AsA, AsB---------- Ashton	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Fair: too clayey.
Bo---------- Boonesboro	Severe: flooding, depth to rock, poor filter.	Severe: seepage, depth to rock, flooding.	Severe: flooding, depth to rock, seepage.	Severe: flooding, depth to rock, seepage.	Poor: area reclaim, thin layer.
Du---------- Dunning	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
EdC---------- Eden	Severe: percs slowly, depth to rock.	Severe: slope.	Severe: too clayey, depth to rock.	Severe: depth to rock.	Poor: too clayey.
EfE---------- Eden	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: slope, too clayey.
EkB---------- Elk	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
EkC---------- Elk	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
EkD---------- Elk	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
ElB---------- Elk	Moderate: flooding.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
ElC---------- Elk	Moderate: slope, flooding.	Severe: slope, flooding.	Moderate: slope, flooding, too clayey.	Moderate: slope, flooding.	Fair: slope, too clayey.
FaC---------- Fairmount	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
FcE*, FcF*: Fairmount----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
FdC---------- Faywood	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FdD---------- Faywood	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack.
FeC3---------- Faywood	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Hu---------- Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
Lc---------- Lawrence	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ld---------- Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
LwB---------- Lowell	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
LwC---------- Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
MaB---------- Maury	Slight----------	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
MaC---------- Maury	Moderate: slope.	Severe: seepage, slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
McB---------- McAfee	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
McC---------- McAfee	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
McD---------- McAfee	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
MdD*: McAfee----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
Me---------- Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ne Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
NhB Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
No Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
OtA Otwell	Severe: wetness, percs slowly.	Slight	Moderate: flooding, wetness.	Moderate: flooding.	Fair: too clayey, thin layer.
OtB Otwell	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: flooding, wetness.	Moderate: flooding.	Fair: too clayey, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AsA, AsB---------- Ashton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bo---------- Boonesboro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Du---------- Dunning	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
EdC---------- Eden	Poor: thin layer, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
EfE---------- Eden	Poor: slope, thin layer, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, large stones.
EkB---------- Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
EkC---------- Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
EkD---------- Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
ElB---------- Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
ElC---------- Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
FaC---------- Fairmount	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
FcE*: Fairmount----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, large stones.
Rock outcrop.				
FcF*: Fairmount----------	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, large stones.
Rock outcrop.				
FdC---------- Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
FdD---------- Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FeC3---------- Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Hu---------- Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Lc---------- Lawrence	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ld---------- Lindside	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
LwB, LwC---------- Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaB---------- Maury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
MaC---------- Maury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
McB, McC---------- McAfee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
McD---------- McAfee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, slope.
MdD*: McAfee---------- Rock outcrop.	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, large stones.
Me---------- Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ne---------- Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NhB---------- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
No---------- Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OtA, OtB---------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
AsA, AsB---------- Ashton	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
Bo---------- Boonesboro	Severe: seepage.	Severe: thin layer, piping.	Deep to water----	Depth to rock----	Depth to rock.
Du---------- Dunning	Slight----------	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
EdC, EfE---------- Eden	Moderate: depth to rock.	Moderate: hard to pack, thin layer, large stones.	Deep to water----	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
EkB---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
EkC, EkD---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Slope----------	Slope.
ElB---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
ElC---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Slope----------	Slope.
FaC---------- Fairmount	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
FcE*, FcF*: Fairmount--------	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
Rock outcrop.					
FdC, FdD---------- Faywood	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
FeC3---------- Faywood	Severe: slope.	Severe: hard to pack.	Deep to water----	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Hu---------- Huntington	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
Lc---------- Lawrence	Slight----------	Severe: piping.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Ld---------- Lindside	Moderate: seepage.	Severe: piping.	Flooding---------	Wetness, erodes easily.	Erodes easily.
LwB---------- Lowell	Moderate: depth to rock.	Moderate: hard to pack.	Deep to water----	Erodes easily----	Erodes easily.
LwC---------- Lowell	Moderate: depth to rock.	Moderate: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
MaB---------- Maury	Severe: seepage.	Moderate: hard to pack.	Deep to water----	Favorable--------	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
MaC---------- Maury	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water----	Slope----------	Slope.
McB---------- McAfee	Moderate: depth to rock, seepage.	Severe: thin layer, hard to pack.	Deep to water----	Depth to rock, erodes easily.	Erodes easily, depth to rock.
McC, McD---------- McAfee	Moderate: depth to rock, seepage.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
MdD*: McAfee----------	Moderate: depth to rock, seepage.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
Me---------- Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
Ne---------- Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
NhB---------- Nicholson	Slight----------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
No---------- Nolin	Severe: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
OtA---------- Otwell	Slight----------	Slight----------	Deep to water----	Erodes easily, rooting depth.	Erodes easily, rooting depth.
OtB---------- Otwell	Moderate: slope.	Slight----------	Deep to water----	Erodes easily, rooting depth.	Erodes easily, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index*
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AsA, AsB--------- Ashton	0-9 9-68	Silt loam-------- Silt loam, silty clay loam.	ML, CL CL, CL-ML	A-4 A-4, A-6	0 0	95-100 95-100	90-100 90-100	75-100 85-100	60-95 80-100	<35 25-40	NP-10 5-20
Bo--------------- Boonesboro	0-18	Silt loam-------- Gravelly silt loam, gravelly loam, very gravelly silty clay loam.	ML, CL, CL-ML GM, GC, CL, CL-ML	A-4, A-6 A-2, A-4, A-6	0-5 0-10	90-100 50-75	85-100 40-70	80-100 35-65	70-95 25-60	25-35 25-40	4-11 4-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Du--------------- Dunning	0-15 15-63	Silty clay loam Silty clay, clay, silty clay loam.	CL CH, CL	A-6, A-7 A-7	0 0	100 95-100	95-100 95-100	90-100 90-100	85-95 85-100	34-42 45-70	15-22 20-40
EdC-------------- Eden	0-5	Silty clay loam	ML, CL, MH, CH	A-7, A-6	0-15	85-100	80-100	75-100	70-100	35-65	12-35
	5-23	Flaggy silty clay, flaggy clay, silty clay.	MH, CH, CL	A-7	10-45	75-100	70-100	65-100	65-95	45-75	20-45
	23-67	Weathered bedrock	---	---	---	---	---	---	---	---	---
EfE-------------- Eden	0-5	Flaggy silty clay	ML, CL, MH, CH	A-7, A-6	25-40	75-95	70-95	70-95	65-95	35-65	12-35
	5-23	Flaggy silty clay, flaggy clay, silty clay.	MH, CH, CL	A-7	10-45	75-100	70-100	65-100	65-95	45-75	20-45
	23-67	Weathered bedrock	---	---	---	---	---	---	---	---	---
EkB, EkC, EkD, ElB, ElC--------- Elk	0-8	Silt loam-------- Silty clay loam, silt loam.	ML, CL, CL-ML ML, CL, CL-ML	A-4 A-4, A-6	0 0	95-100 95-100	95-100 90-100	85-100 85-100	70-95 75-100	25-35 25-40	3-10 5-15
	46-62	Silty clay loam, silt loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
FaC-------------- Fairmount	0-10 10-16	Flaggy silty clay Flaggy silty clay loam, flaggy clay, flaggy silty clay.	CH, CL CH, CL	A-7 A-7, A-6	8-50 8-50	80-100 80-100	70-100 70-100	65-100 65-100	60-100 60-100	45-70 40-70	20-40 20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FcE**, FcF**: Fairmount------- Rock outcrop.	0-10 10-16	Flaggy silty clay Flaggy silty clay loam, flaggy clay, flaggy silty clay.	CH, CL CH, CL	A-7 A-7, A-6	8-50 8-50	80-100 80-100	70-100 70-100	65-100 65-100	60-100 60-100	45-70 40-70	20-40 20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FdC, FdD--------- Faywood	0-5	Silt loam-------- Silty clay, clay, silty clay loam.	ML, CL, CL-ML CH, CL	A-4 A-7	0-15 0-15	100 90-100	95-100 90-100	90-100 85-100	85-100 75-100	25-35 42-70	4-10 20-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index*
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FeC3---------- Faywood	0-5	Silty clay-------	CL, CH, MH	A-7	0-15	90-100	90-100	85-100	80-100	45-60	20-30
	5-29	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hu---------- Huntington	0-10	Silt loam--------	ML, CL	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	10-58	Silt loam, loam, silty clay loam.	ML, CL	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	58-68	Stratified sandy clay loam to silt loam.	SM, SC, ML, CL	A-2, A-4	0	95-100	60-100	50-90	30-75	<30	NP-10
Lc---------- Lawrence	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
	7-24	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	24-62	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	62-75	Silty clay, silty clay loam, silt loam.	ML, CL, MH, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	75-100	25-60	5-25
Ld---------- Lindside	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	7-41	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	41-67	Stratified silty clay loam to gravelly sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18
LwB, LwC---------- Lowell	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	7-12	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	12-57	Clay, silty clay	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
	57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MaB, MaC---------- Maury	0-17	Silt loam--------	CL-ML, ML	A-4	0	100	95-100	90-100	80-100	25-35	4-10
	17-25	Silty clay loam	ML, CL	A-6, A-7, A-4	0	95-100	95-100	85-100	80-100	30-50	8-26
	25-64	Silty clay, clay, silty clay loam.	MH, CH, CL	A-7, A-6	0	90-100	90-100	85-100	75-100	35-65	15-35
McB, McC, McD---- McAfee	0-7	Silt loam--------	ML, CL-ML	A-4	0-10	90-100	85-100	75-100	70-100	25-35	4-10
	7-26	Silty clay, silty clay loam, clay.	CL, CH, MH	A-7, A-6	0-10	90-100	85-100	80-100	75-100	35-65	15-35
	26-31	Clay, silty clay	CH, MH, CL	A-7	0-15	80-100	75-100	70-100	65-95	45-75	20-45
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MdD**: McAfee----------	0-7	Silt loam--------	ML, CL-ML	A-4	0-10	90-100	85-100	75-100	70-100	25-35	4-10
	7-26	Silty clay, silty clay loam, clay.	CL, CH, MH	A-7, A-6	0-10	90-100	85-100	80-100	75-100	35-65	15-35
	26-31	Clay, silty clay	CH, MH, CL	A-7	0-15	80-100	75-100	70-100	65-95	45-75	20-45
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Me---------- Melvin	0-8	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	8-28	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20
	28-65	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-95	25-40	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index*
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ne---------- Newark	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	9-32	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	22-42	3-20
	32-64	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
NhB---------- Nicholson	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	7-27	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	27-39	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-95	25-45	5-20
	39-62	Silty clay, clay	CH, CL	A-6, A-7	0-5	80-100	80-100	70-100	60-95	34-70	16-40
No---------- Nolin	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	9-57	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
	57-64	Loam, silt loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-5	75-100	70-100	60-95	50-95	<30	NP-15
OtA, OtB---------- Otwell	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	7-24	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-20
	24-58	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-90	35-50	15-30
	58-70	Stratified silt loam to silty clay.	CL	A-6, A-7	0	95-100	75-100	75-100	75-95	35-50	15-30

* NP means nonplastic.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
AsA, AsB	0-9	10-25	1.20-1.40	0.6-2.0	0.16-0.23	5.6-7.3	Low	0.32	5	2-4
Ashton	9-68	18-34	1.20-1.50	0.6-2.0	0.18-0.23	5.6-7.3	Low	0.43		
Bo	0-18	15-27	1.20-1.40	0.6-2.0	0.18-0.23	6.1-7.8	Low	0.37	3	3-5
Boonesboro	18-28	15-35	1.20-1.40	6.0-20	0.06-0.12	6.1-7.8	Low	0.17		
	28	---	---	---	---	---	---	---		
Du	0-15	27-40	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Moderate	0.32	5	2-10
Dunning	15-63	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate	0.28		
EdC	0-5	27-50	1.35-1.55	0.06-0.6	0.12-0.18	5.1-8.4	Moderate	0.43	3	.5-3
Eden	5-23	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate	0.28		
	23-67	---	---	---	---	---	---	0.17		
EfE	0-5	27-60	1.45-1.65	0.06-0.6	0.11-0.17	5.1-8.4	Moderate	0.17	3	.5-3
Eden	5-23	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate	0.28		
	23-67	---	---	---	---	---	---	0.17		
EkB, EkC, EkD, ElB, ElC	0-8	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.37	5	.5-3
Elk	8-46	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.28		
	46-62	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low	0.28		
FaC	0-10	40-60	1.30-1.50	0.06-0.6	0.10-0.18	6.6-8.4	Moderate	0.24	2	3-7
Fairmount	10-16	35-60	1.40-1.60	0.06-0.6	0.10-0.18	6.6-8.4	Moderate	0.37		
	16	---	---	---	---	---	---	---		
FcE*, FcF*:										
Fairmount	0-10	40-60	1.30-1.50	0.06-0.6	0.10-0.18	6.6-8.4	Moderate	0.24	2	3-7
	10-16	35-60	1.40-1.60	0.06-0.6	0.10-0.18	6.6-8.4	Moderate	0.37		
	16	---	---	---	---	---	---	---		
Rock outcrop.										
FdC, FdD	0-5	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low	0.37	3	1-4
Faywood	5-34	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	34	---	---	---	---	---	---	---		
FeC3	0-5	40-60	1.30-1.60	0.2-0.6	0.14-0.18	5.1-7.8	Moderate	0.32	2	<2
Faywood	5-29	35-60	1.35-1.60	0.06-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	29	---	---	---	---	---	---	---		
Hu	0-10	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low	0.28	5	3-6
Huntington	10-58	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low	0.32		
	58-68	15-27	1.30-1.50	0.6-2.0	0.10-0.16	5.6-7.8	Low	0.28		
Lc	0-7	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.43	3	1-4
Lawrence	7-24	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.37		
	24-62	18-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-7.3	Low	0.43		
	62-75	18-60	1.50-1.70	0.06-0.6	0.08-0.12	4.5-7.3	Low	0.37		
Ld	0-7	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.1-6.5	Low	0.32	5	2-4
Lindside	7-41	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-6.5	Low	0.37		
	41-67	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-6.5	Low	0.32		
LwB, LwC	0-7	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low	0.37	3	1-4
Lowell	7-12	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate	0.28		
	12-57	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	57	---	---	---	---	---	---	---		
MaB, MaC	0-17	12-27	1.20-1.40	2.0-6.0	0.18-0.23	5.1-7.3	Low	0.32	5	2-5
Maury	17-25	35-40	1.30-1.55	0.6-6.0	0.18-0.22	5.1-6.5	Low	0.28		
	25-64	35-60	1.40-1.60	0.6-2.0	0.13-0.18	4.5-6.0	Low	0.28		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
McB, McC, McD----	0-7	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.37	3	2-5
McAfee	7-26	35-60	1.30-1.50	0.2-0.6	0.13-0.18	5.6-7.3	Moderate-----	0.28		
	26-31	40-60	1.30-1.60	0.2-0.6	0.10-0.16	6.1-7.8	Moderate-----	0.28		
	31	---	---	---	---	---	----------	----		
MdD*:										
McAfee----------	0-7	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.37	3	2-5
	7-26	35-60	1.30-1.50	0.2-0.6	0.13-0.18	5.6-7.3	Moderate-----	0.28		
	26-31	40-60	1.30-1.60	0.2-0.6	0.10-0.16	6.1-7.8	Moderate-----	0.28		
	31	---	---	---	---	---	----------	----		
Rock outcrop.										
Me----------	0-8	12-17	1.20-1.60	0.6-2.0	0.18-0.23	6.1-7.8	Low----------	0.43	5	5-3
Melvin	8-28	12-35	1.30-1.60	0.6-2.0	0.18-0.23	6.1-7.8	Low----------	0.43		
	28-65	7-35	1.40-1.70	0.6-2.0	0.16-0.23	6.1-7.8	Low----------	0.43		
Ne----------	0-9	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	1-4
Newark	9-32	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
	32-64	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
NhB----------	0-7	12-30	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.0	Low----------	0.43	3	2-4
Nicholson	7-27	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.43		
	27-39	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.0	Low----------	0.43		
	39-62	35-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-7.8	Moderate-----	0.37		
No----------	0-9	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	2-4
Nolin	9-57	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43		
	57-64	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.6-8.4	Low----------	0.43		
OtA, OtB----------	0-7	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	.5-2
Otwell	7-24	22-30	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.43		
	24-58	18-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Moderate-----	0.43		
	58-70	20-30	1.50-1.65	0.06-0.2	0.06-0.08	4.5-5.5	Moderate-----	0.43		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
AsA, AsB---------- Ashton	B	Rare--------	---	---	>6.0	---	---	>60	---	Low------	Low.
Bo---------- Boonesboro	B	Occasional	Brief-----	Jan-Apr	>6.0	---	---	20-40	Hard	Low------	Low.
Du---------- Dunning	D	Occasional	Brief-----	Dec-May	0-0.5	Apparent	Jan-Apr	>60	---	High-----	Moderate.
EdC, EfE---------- Eden	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low.
EkB, EkC, EkD----- Elk	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
ElB, ElC---------- Elk	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
FaC---------- Fairmount	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
FcE*, FcF*: Fairmount--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
Rock outcrop.											
FdC, FdD, FeC3---- Faywood	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Hu---------- Huntington	B	Occasional	Brief-----	Dec-May	>6.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.
Lc---------- Lawrence	C	Rare--------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High-----	High.
Ld---------- Lindside	C	Occasional	Very brief	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
LwB, LwC---------- Lowell	C	None--------	---	---	>6.0	---	---	>40	Hard	High-----	Moderate.
MaB, MaC---------- Maury	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
McB, McC, McD----- McAfee	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
MdD*: McAfee----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Rock outcrop.											
Me---------- Melvin	D	Occasional	Brief-----	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
Ne---------- Newark	C	Occasional	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Low.
NhB---------- Nicholson	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High-----	Moderate.
No---------- Nolin	B	Occasional	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
OtA---------- Otwell	C	Rare--------	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.
OtB---------- Otwell	C	Rare--------	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ashton	Fine-silty, mixed, mesic Mollic Hapludalfs
Boonesboro	Fine-loamy, mixed, mesic Fluventic Hapludolls
Dunning	Fine, mixed, mesic Fluvaquentic Haplaquolls
Eden	Fine, mixed, mesic Typic Hapludalfs
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Fairmount	Clayey, mixed, mesic Lithic Hapludolls
Faywood	Fine, mixed, mesic Typic Hapludalfs
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Lawrence	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Lowell	Fine, mixed, mesic Typic Hapludalfs
Maury	Fine, mixed, mesic Typic Paleudalfs
McAfee	Fine, mixed, mesic Mollic Hapludalfs
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell	Fine-silty, mixed, mesic Typic Fragiudalfs

☆ U.S. GOVERNMENT PRINTING OFFICE: 1985 O - 442-069 QL 3

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LEGEND

1 — EDEN: Moderately deep, well drained soils that have a clayey subsoil; on strongly sloping to steep hillsides and on sloping to strongly sloping ridgetops

2 — FAYWOOD-LOWELL: Moderately deep and deep, well drained soils that have a clayey subsoil; on strongly sloping to moderately steep hillsides and on gently sloping to sloping ridgetops

3 — FAIRMOUNT-ROCK OUTCROP-MCAFEE: Shallow and moderately deep, well drained soils that have a clayey subsoil and Rock outcrop; on strongly sloping to very steep hillsides and bluffs and on sloping ridgetops

Compiled 1983

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

N

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY AGRICULTURAL EXPERIMENT STATION

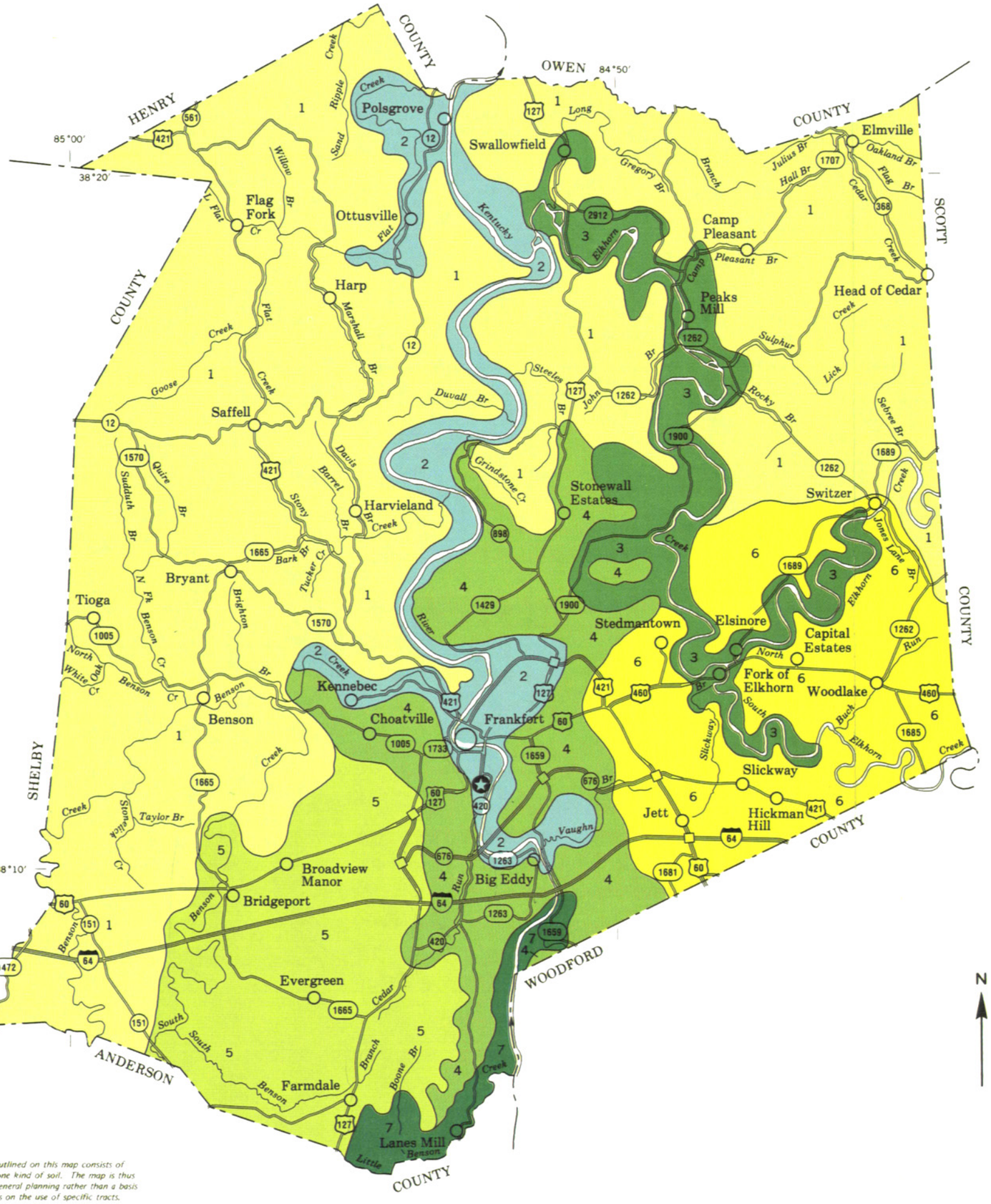
GENERAL SOIL MAP

ANDERSON COUNTY, KENTUCKY

Scale 1:126,720

1 0 1 2 3 4 Miles

1 0 3 6 Km



LEGEND

1 — EDEN: Moderately deep, well drained soils that have a clayey subsoil; on strongly sloping to steep hillsides and on sloping to strongly sloping ridgetops

2 — ELK-MCAFEE-OTWELL: Deep, well drained and moderately well drained soils that have a loamy subsoil, on nearly level to strongly sloping stream terraces, and moderately deep, well drained soils that have a clayey subsoil, on gently sloping to strongly sloping, low uplands

3 — ASHTON-HUNTINGTON-ELK: Deep, well drained soils that have a loamy subsoil; on nearly level to strongly sloping, low stream terraces and flood plains

4 — MCAFEE-FAYWOOD-FAIRMOUNT: Moderately deep and shallow, well drained soils that have a clayey subsoil; on sloping ridgetops and on strongly sloping to very steep hillsides and bluffs

5 — FAYWOOD-LOWELL: Moderately deep and deep, well drained soils that have a clayey subsoil; on strongly sloping to moderately steep hillsides and on gently sloping to sloping ridgetops

6 — MAURY-MCAFEE: Deep and moderately deep, well drained soils that have a clayey subsoil; on gently sloping to strongly sloping ridges, shoulder slopes, and hillsides

7 — FAIRMOUNT-ROCK OUTCROP-MCAFEE: Shallow and moderately deep, well drained soils that have a clayey subsoil and Rock outcrop; on strongly sloping to very steep hillsides and bluffs and on sloping ridgetops

Compiled 1983

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY AGRICULTURAL EXPERIMENT STATION

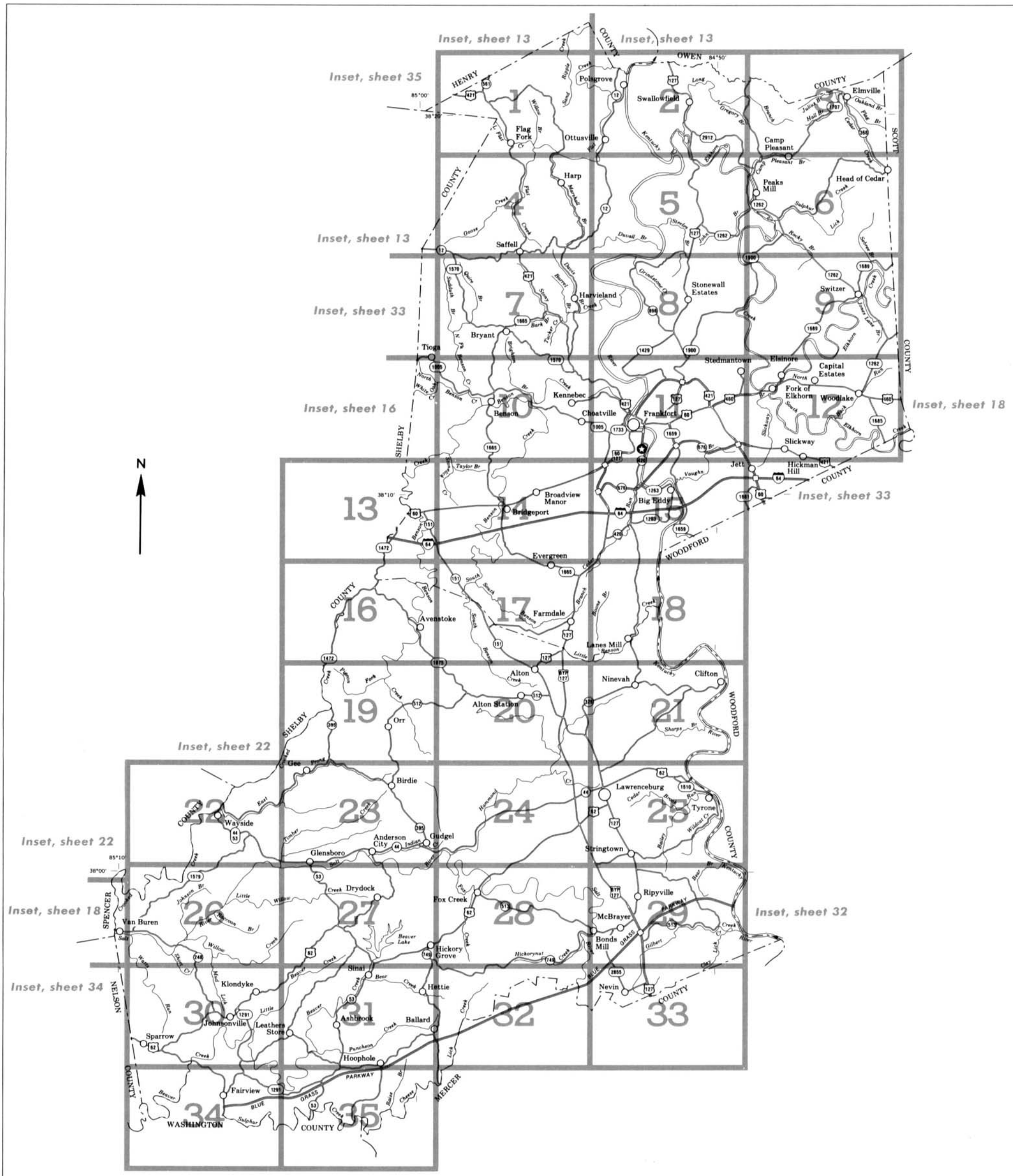
GENERAL SOIL MAP

FRANKLIN COUNTY, KENTUCKY

Scale 1:126,720

1 0 1 2 3 4 Miles

1 0 3 6 Km



Original text from each individual map sheet read:

This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

INDEX TO MAP SHEETS

ANDERSON AND FRANKLIN COUNTIES, KENTUCKY

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a small letter connotative of the soil name if possible. The third, if used, is a capital letter and indicates the slope class. Symbols without a slope letter are nearly level. If the number 3 is added to the symbol it indicates that the soil is severely eroded. Symbols without a number indicate either moderate erosion or none to slight erosion.

SYMBOL	NAME
AsA	Ashton silt loam, rarely flooded, 0 to 2 percent slopes
AsB	Ashton silt loam, rarely flooded, 2 to 6 percent slopes
Bo	Boonesboro silt loam, occasionally flooded
Du	Dunning silty clay loam, occasionally flooded
EdC	Eden silty clay loam, 6 to 15 percent slopes
EfE	Eden flaggy silty clay, 15 to 35 percent slopes
EkB	Elk silt loam, 2 to 6 percent slopes
EkC	Elk silt loam, 6 to 12 percent slopes
EkD	Elk silt loam, 12 to 20 percent slopes
ElB	Elk silt loam, rarely flooded, 2 to 6 percent slopes
ElC	Elk silt loam, rarely flooded, 6 to 12 percent slopes
FaC	Fairmount flaggy silty clay, 6 to 12 percent slopes
FcE	Fairmount-Rock outcrop complex, 12 to 30 percent slopes
FcF	Fairmount-Rock outcrop complex, 30 to 60 percent slopes
FdC	Faywood silt loam, 6 to 12 percent slopes
FdD	Faywood silt loam, 12 to 30 percent slopes
FeC3	Faywood silty clay, 6 to 12 percent slopes, severely eroded
Hu	Huntington silt loam, occasionally flooded
Lc	Lawrence silt loam, rarely flooded
Ld	Lindside silt loam, occasionally flooded
LwB	Lowell silt loam, 2 to 6 percent slopes
LwC	Lowell silt loam, 6 to 12 percent slopes
MaB	Maury silt loam, 2 to 6 percent slopes
MaC	Maury silt loam, 6 to 12 percent slopes
McB	McAfee silt loam, 2 to 6 percent slopes
McC	McAfee silt loam, 6 to 12 percent slopes
McD	McAfee silt loam, 12 to 20 percent slopes
MdD	McAfee-Rock outcrop complex, 6 to 20 percent slopes
Me	Melvin silt loam, occasionally flooded
Ne	Newark silt loam, occasionally flooded
NhB	Nicholson silt loam, 2 to 6 percent slopes
No	Nolin silt loam, occasionally flooded
OtA	Otwell silt loam, rarely flooded, 0 to 2 percent slopes
OtB	Otwell silt loam, rarely flooded, 2 to 6 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline
- AD HOC BOUNDARY (label) — Hedley Airstrip
- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE
- STATE COORDINATE TICK
- LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 71
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — CnB, WaC2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

ANDERSON AND FRANKLIN COUNTIES, KENTUCKY — SHEET NUMBER 1

1 790 000 FEET

310 000 FEET

(Joins inset, sheet 35)

(Joins inset A, sheet 13)

(Joins sheet 2)

(Joins sheet 4)

1 810 000 FEET

300 000 FEET

HENRY COUNTY

SHELBY COUNTY

Flat Creek

Little Flat Creek

Willow Branch

Sand Ripple

Bo Creek

421

a21

N

5 000 Feet

1 Kilometer

Scale - 1:20000

(2)

N

(Joins inset C, sheet 13)

1 835 000 FEET

310 000 FEET

300 000 FEET

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 5)

1 815 000 FEET

5 000 Feet

1 Kilometer

Scale - 1:20000

0 1 000 2 000 3 000 4 000 5 000

0 .5 1

COUNTY

HENRY

OWEN

KENTUCKY RIVER

Flat Creek

Polsgrove

Ottusville

Swallowfield

Elkhorn Creek

Gregory Branch

Indian Gap Hill

U S FISH CULTURAL STATION

127

12

ANDERSON AND FRANKLIN COUNTIES, KENTUCKY — SHEET NUMBER 3

3

N

1 840 000 FEET

310 000 FEET

300 000 FEET

(Joins sheet 2)

(Joins sheet 6)

1 860 000 FEET

5 000 Feet

1 Kilometer

Scale - 1:20000

MOUNT VERNON

OWEN COUNTY

SCOTT COUNTY

UNION RIDGE

Cedar Branch

Long Branch

Julius Hall Branch

Flag Branch

Oakland Branch

Camp Pleasant Branch

Eminville

368

1707

EdC EfE EfB FcF FdC Bo No LwB LwC

(Joins sheet 1)

(Joins inset, sheet 13)

(Joins sheet 7)

(Joins sheet 5)

1 810 000 FEET

1 790 000 FEET

285 000 FEET

295 000 FEET

Scale - 1:20000

5 000 Feet

1 Kilometer

SHELBY COUNTY

Marshall Branch

Flat Creek

Goose Creek

Dry Ridge

Saffell

Stony Creek

Davis Branch


1 815 000 FEET
(Joins sheet 2)
295 000 FEET
285 000 FEET
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 8)
1 835 000 FEET
KENTUCKY RIVER
Steeles Branch
Dutail Branch
Onan Bend
Elkhorn Creek
Elkhorn
ELKHORN CREEK
water
5
N
5,000 Feet
1 Kilometer
Scale - 1:20000

6

N

(Joins sheet 3)

1 860 000 FEET

295 000 FEET

285 000 FEET

1 840 000 FEET

(Joins sheet 9)

(Joins sheet 5)

5 000 Feet

1 Kilometer

Scale - 1:20000

Peaks Mill

ELKHORN

Sulphur Creek

Rocky Branch

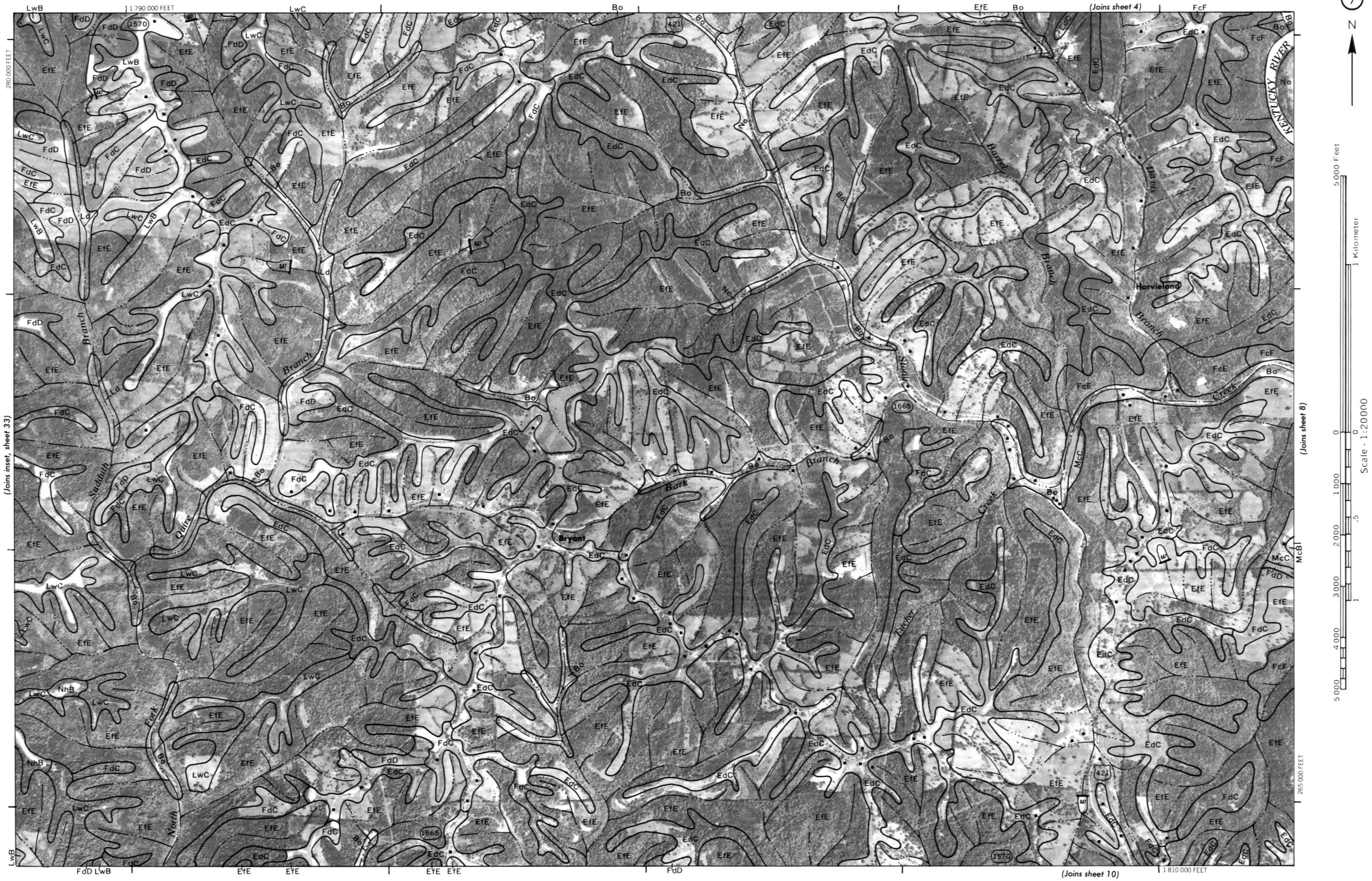
Elkhorn Creek

Scotts Branch

SCOTT COUNTY

1262

368


7
N
(Joins sheet 4)
(Joins sheet 8)
(Joins sheet 10)
(Joins inset, sheet 33)
1 790 000 FEET
1 810 000 FEET
280 000 FEET
265 000 FEET
KENTUCKY RIVER
Harvieland
Bryant
Barrel Branch
Davis Branch
Stoner Creek
Bark Branch
Tucker Creek
Quire Branch
Suddith Branch
North Fork
1570
421
1665
5 000 Feet
1 Kilometer
Scale - 1:20000
0
1000
2000
3000
4000
5000
0
.5
1

N

Scale - 1:20000

5,000 Feet

1 Kilometer

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 11)

1 835 000 FEET

280 000 FEET

265 000 FEET

1 815 000 FEET

Grindstone Creek

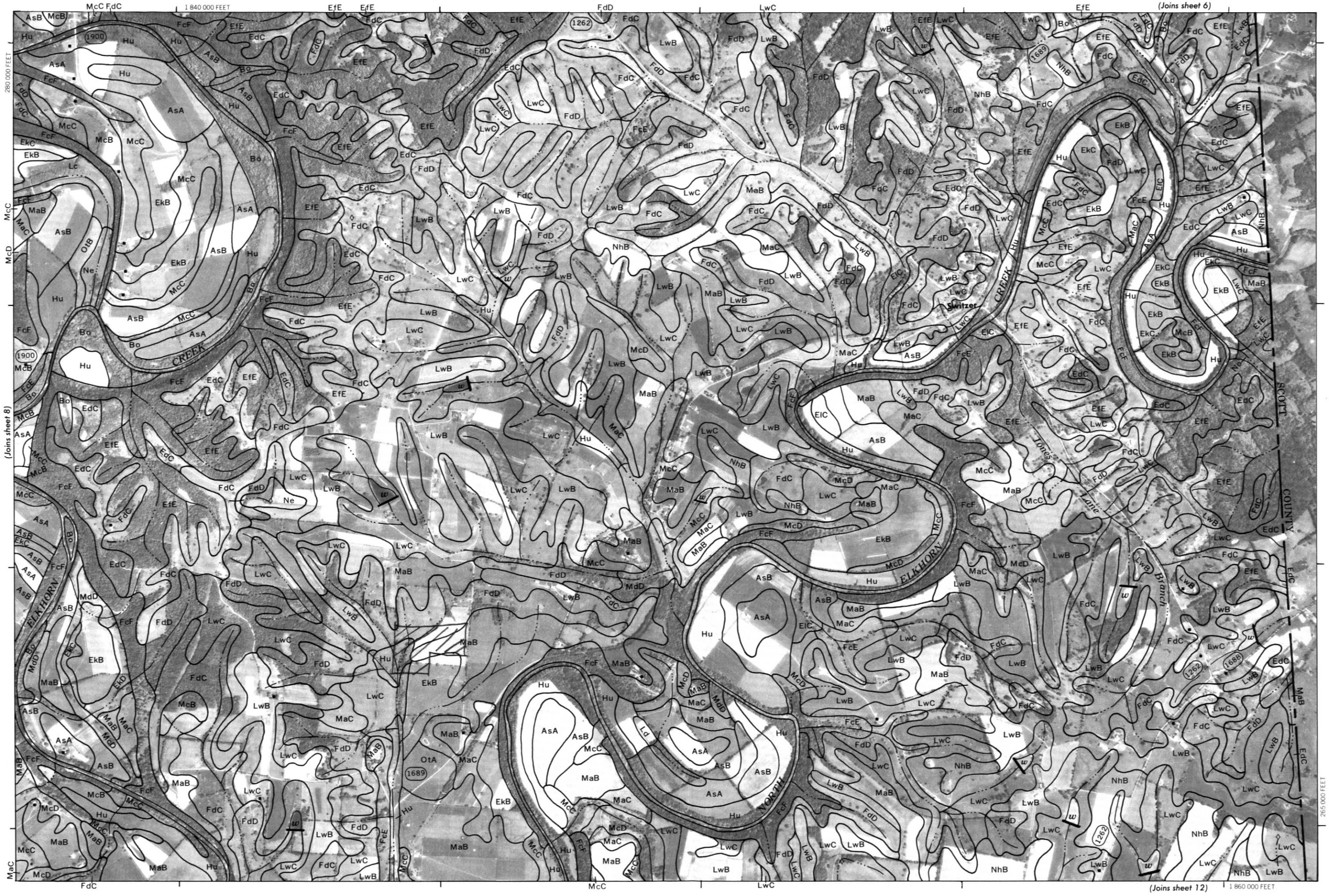
Glass Pond

RIVER

KENTUCKY

Elkhorn Creek

The Backbone



9

N

5,000 Feet

1 Kilometer

Scale - 1:20000

ANDERSON AND FRANKLIN COUNTIES, KENTUCKY — SHEET NUMBER 10

10

N

(Joins sheet 7)

1 810 000 FEET

260 000 FEET

250 000 FEET

1 790 000 FEET

(Joins sheet 14)

(Joins inset, sheet 16)

(Joins sheet 11)

5 000 Feet

1 Kilometer

Scale - 1:20000

North Fork

Benson Creek

Brighton Branch

Benson Creek

Benson Creek

Benson

Kennebec

Choateville

Stonelick Creek

Taylor Branch

South Fork

Pea Ridge

LOUISVILLE AND NASHVILLE

(Joins sheet 8)

(Joins sheet 10)

(Joins sheet 12)

(Joins sheet 15)

1 815 000 FEET

1 835 000 FEET

260 000 FEET

250 000 FEET

N

5 000 Feet

1 Kilometer

Scale - 1:20000

Stedmantown

Fort Hill

FRANKFORT

STATE COLLEGE

Frankfort State Hospital and School

Cliffside

KENTUCKY STATE CAPITOL

CAPITOL CITY AIRPORT

JUNIPER HILL MUNICIPAL PARK

Benson Creek

KENTUCKY RIVER

Penitentiary Branch

Vaughn Branch

Trumbo Bottom

LOUISVILLE

CINCINNATI

NASHVILLE

FRANKFORT

N

Scale - 1:20000

5 000 Feet 0 1 000 2 000 3 000 4 000 5 000

1 Kilometer 0 .5 1

(Joins sheet 9)

(Joins sheet 11)

(Joins inset, sheet 33)

(Joins inset A, sheet 18)

1 860 000 FEET

250 000 FEET

1 840 000 FEET

Elsinore

Forks of Elkhorn

Slickaway

Woodlake

FRANKFORT CINCINNATI AND LOUISVILLE NASHVILLE

ELKHORN CREEK

NORTH Branch

SOUTH Branch

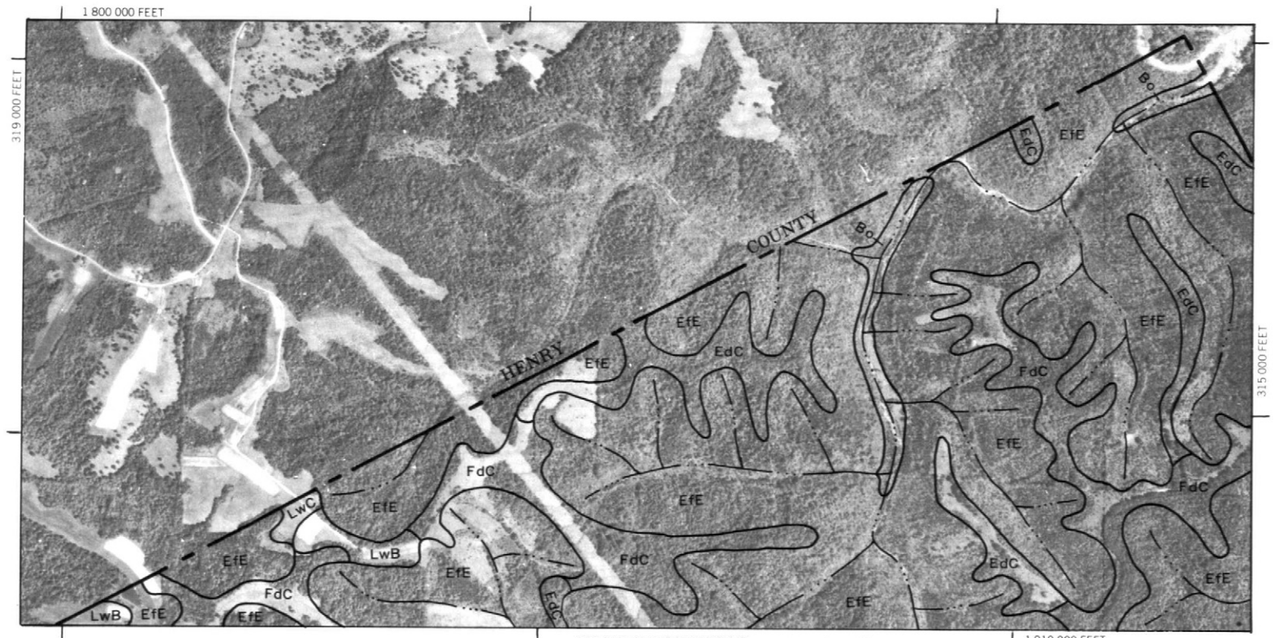
Hickman Hill

Buck Run

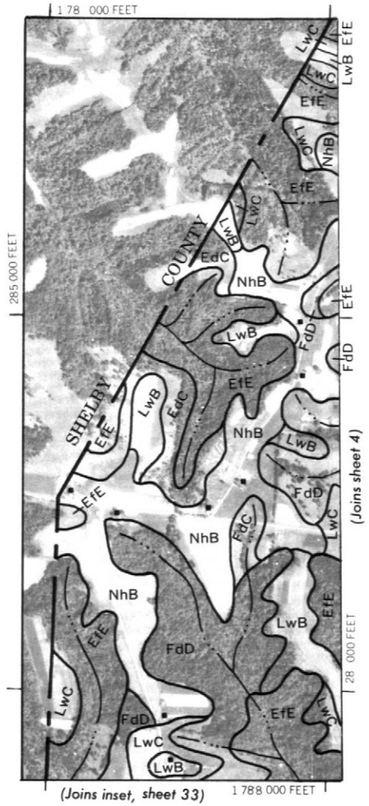
WOODFORD COUNTY

13

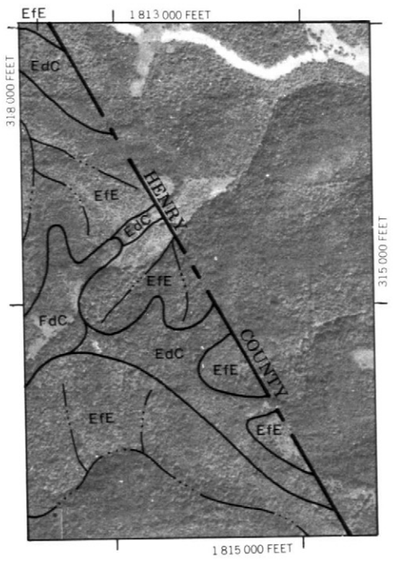
INSET A

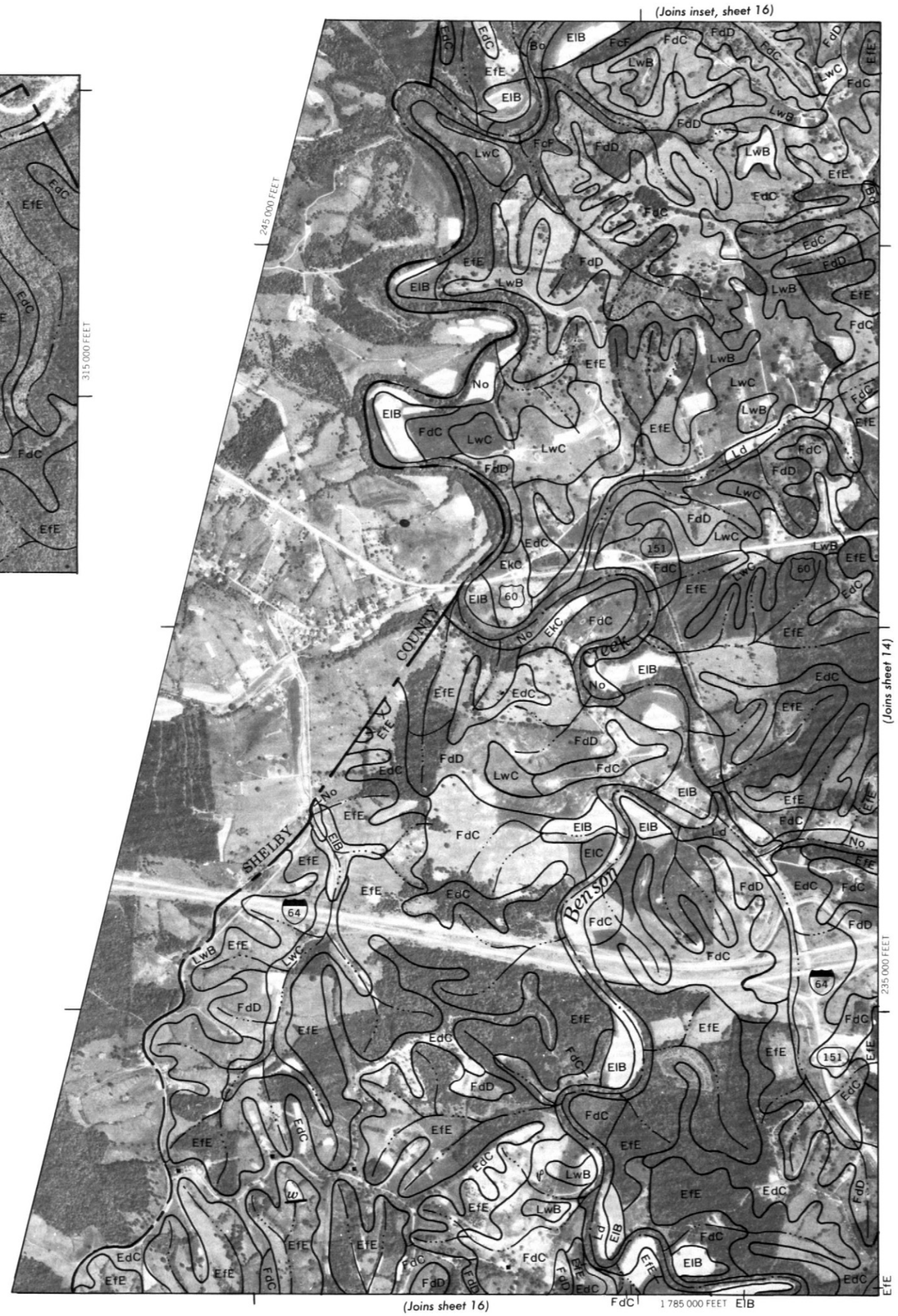


INSET B



INSET C





14

N

5 000 Feet

1 Kilometer

Scale - 1:20000

0 1 000 2 000 3 000 4 000 5 000

0 .5 1

(Joins sheet 10)

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 17)

1 810 000 FEET

1 790 000 FEET

245 000 FEET

235 000 FEET

Taylor Branch

Stonelick Creek

Benson Creek

South Benson Creek

Hickory Hill Lake

Bridgeport

Broadview Manor

1665

60

64


1 815 000 FEET
1 835 000 FEET
245 000 FEET
235 000 FEET
(Joins sheet 11)
(Joins inset, sheet 33)
(Joins sheet 14)
(Joins sheet 18)
KENTUCKY RIVER
Big Eddy
Trumbo Bot
Vaughn
Glenns Creek Hu
Cedar Run
SEWAGE DISPOSAL
LOUISVILLE AND
WOODFORD COUNTY
Jett
15
N
5,000 Feet
1 Kilometer
Scale - 1:20000


16
N
5 000 Feet
1 Kilometer
Scale - 1:20000
(Joins inset, sheet 33)
1 787 000 FEET
260 000 FEET
250 000 FEET
1 783 000 FEET
(Joins sheet 13)
1000 AND 4000-FOOT GRID TICKS
(Joins sheet 10)
North Benson Creek
LOUISVILLE AND NASHVILLE
White Oak Creek
SHELBY COUNTY
Benson
(Joins sheet 13)
1 785 000 FEET
230 000 FEET
220 000 FEET
FRANKLIN COUNTY
ANDERSON COUNTY
LANDFILL
SOUTHERN
Avenstoke
Creek
Benson
(Joins sheet 17)
1 770 000 FEET
(Joins sheet 19)

1 790 000 FEET

230 000 FEET

(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 20)

220 000 FEET

1 810 000 FEET

17

N

5 000 Feet

1 Kilometer

Scale - 1:20000

Farmdale

FRANKLIN COUNTY

ANDERSON COUNTY

LANDFILL

Benson Creek

South Benson Creek

South Fork Benson Creek

Hu

SOUTHERN

N

Scale - 1:20000

5 000 Feet

1 Kilometer

(Joins sheet 15)

1 820 000 FEET

230 000 FEET

(Joins sheet 17)

220 000 FEET

1 815 000 FEET

(Joins sheet 21)

INSET A

1 863 000 FEET

(Joins sheet 12)

260 000 FEET

255 000 FEET

1 862 000 FEET

1000 AND 5000-FOOT GRID TICKS

INSET B

(Joins inset, sheet 22)

1 738 000 FEET

180 000 FEET

1 735 000 FEET

170 000 FEET

(Joins sheet 26)

1 830 000 FEET

(Joins inset, sheet 34)

3000 AND 5000-FOOT GRID TICKS

Boone Branch

Benson Creek

Little Benson Creek

Lones Mills

Lovers Leap

Turkey Run

Kentucky River

Woodford County

Franklin County

Anderson County

Spencer County

Nelson County

Crooked Creek

Taylorsville Lake

Watts Run

S. Elkhorn Ck

Hu Run

SCOTT COUNTY

460

WOODFORD CO

FRANKLIN CO

ANDERSON CO

1 765 000 FEET

215 000 FEET

(Joins sheet 16)

(Joins inset A, sheet 22)

(Joins sheet 20)

(Joins sheet 23)

1 785 000 FEET

200 000 FEET

N

5 000 Feet

1 Kilometer

Scale - 1:20000

COUNTY

Shelby Creek

Crooked Creek

Pigeon Fork

Pryong

East

Benson Creek

Bo Creek

395

512

20

N

(Joins sheet 17)

1 810 000 FEET

215 000 FEET

5,000 Feet

1 Kilometer

Scale - 1:20000

(Joins sheet 19)

(Joins sheet 21)

200 000 FEET

1 790 000 FEET

(Joins sheet 24)

Alton

Alton Station

Benson Creek

South

Hammond Creek

SOUTHERN

127

512

326

EfE EdC FdC FdD LwC LwB NhB Lc Ne OtA Bo FeC3 EkB EkC ElB FaC FcE Ld MaB OtB No

N

1 815 000 FEET

1 835 000 FEET

215 000 FEET

200 000 FEET

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 25)

Turkey Run

Sharps Branch

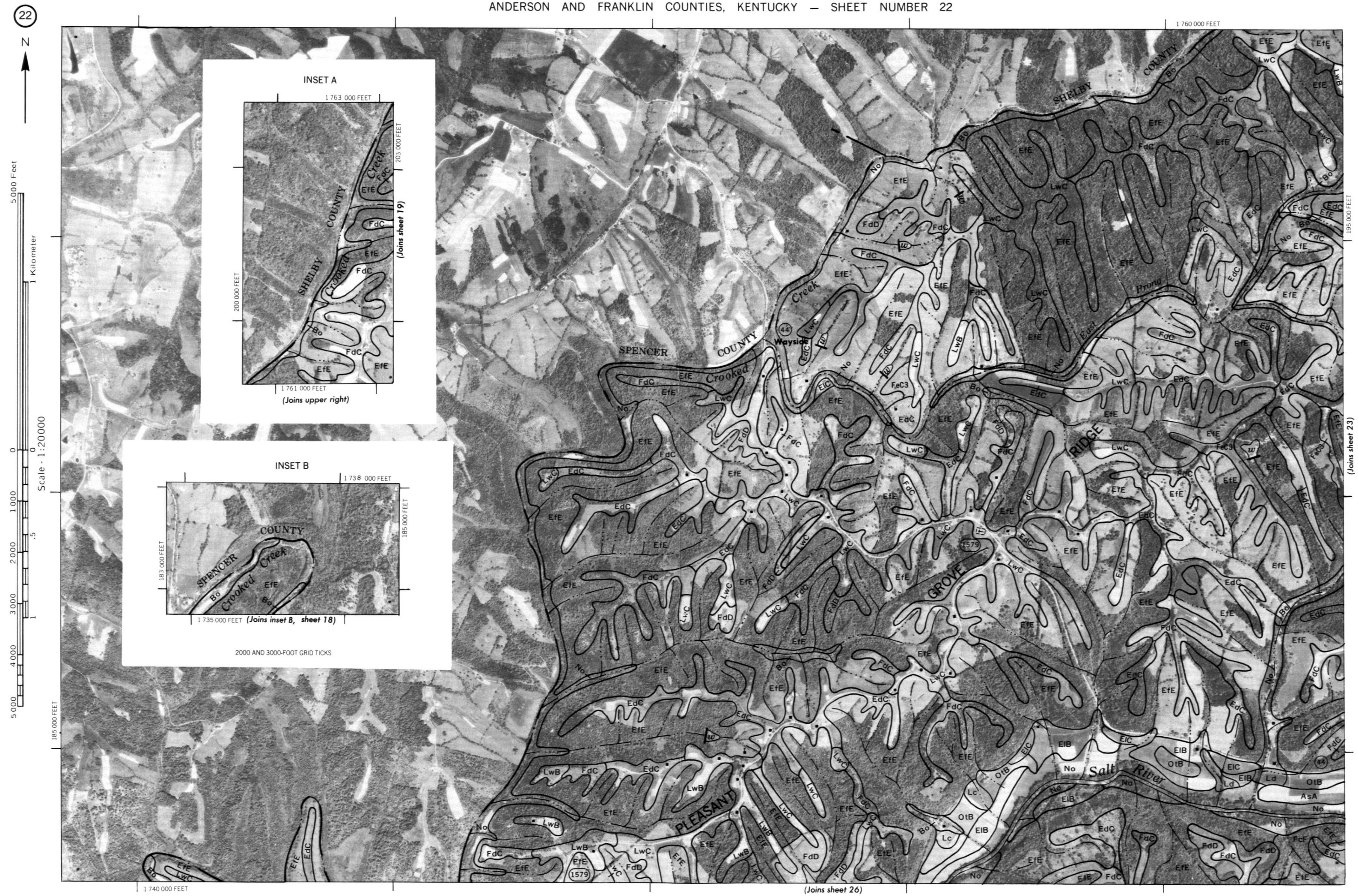
WOODFORD COUNTY

SOUTHERN

127

5,000 Feet 0 1 Kilometer

Scale - 1:20000


22
N
Scale - 1:20000
5 000 Feet
1 Kilometer
INSET A
1 763 000 FEET
203 000 FEET
200 000 FEET
1 761 000 FEET
(Joins sheet 19)
(Joins upper right)
SHELBY
COUNTY
Crooked
Creek
INSET B
1 738 000 FEET
185 000 FEET
183 000 FEET
1 735 000 FEET
(Joins inset B, sheet 18)
SPENCER
COUNTY
Crooked Creek
2000 AND 3000-FOOT GRID TICKS
1 760 000 FEET
195 000 FEET
185 000 FEET
1 740 000 FEET
(Joins sheet 23)
(Joins sheet 26)
SHELBY COUNTY
SPENCER COUNTY
Crooked Creek
East Prong
Wayside
RIDGE
GROVE
PLEASANT
Salt River
44
1579


(Joins sheet 19)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 27)
Birdie
Mudlick Hollow
Timber Creek
Wolf Creek
Anderson City
Glensboro
Gudgel
Indian Creek
Salt River
Salt River
395
44
EfE
EdC
FdC
FdD
LwC
LwB
Bo
No
w
Ld
FaC
FcF
Hu
OtA
AsA
OtB
ElB
Ne
EkB
FdD1
5,000 Feet
1 Kilometer
Scale - 1:20000
0
1000
2000
3000
4000
5000
.5
1
N
23

ANDERSON AND FRANKLIN COUNTIES, KENTUCKY — SHEET NUMBER 24

24

N

Scale - 1:20000

5,000 Feet 0 1 000 2 000 3 000 4 000 5 000

1 Kilometer 0 .5 1

(Joins sheet 20) | 1 810 000 FEET | 195 000 FEET | (Joins sheet 25)

185 000 FEET | (Joins sheet 23) | (Joins sheet 28) | 1 790 000 FEET

Indian Creek | Hammond | Salt River

EfE EdC FdC FdD LwC LwB NhB NhC No Bo EkB EkC ElB ElC FcE FcF AsA OtA OtB Ne Ld

(Joins sheet 21)

1 815 000 FEET

195 000 FEET

(Joins sheet 24)

(Joins sheet 29)

1 835 000 FEET

185 000 FEET

25

N

5 000 Feet

1 Kilometer

Scale - 1:20000

LAWRENCEBURG

Stringtown

Tyrone

WOODFORD COUNTY

KENTUCKY RIVER

Cedar Brook

Bailey Run

Wildcat Creek

SOUTHERN

N

Scale - 1:20000

5 000 Feet 0 1 Kilometer

(Joins sheet 22)

(Joins inset, sheet 18)

(Joins sheet 30)

(Joins sheet 27)

1 760 000 FEET

180 000 FEET

170 000 FEET

1 740 000 FEET

SPENCER COUNTY

RIDGE

Crooked Creek

GROVE

PLEASANT

Taylorsville Lake

Johnson Branch

Salt River

Willow Creek

Mud Lick

Short Creek

Watts Run

Raccoon Branch

PLEASANT HILL RIDGE

Little Willow Creek

1579

27

N

1 765 000 FEET

180 000 FEET

170 000 FEET

1 785 000 FEET

(Joins sheet 23)

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 31)

Salt River

Willow Creek

Little Beaver Creek

Beaver Lake

Drydock

Cross Branch

PLEASANT HILL RIDGE

5 000 Feet

1 Kilometer

Scale - 1:20000

N

5 000 Feet

1 Kilometer

Scale - 1:20000

(Joins sheet 24)

(Joins sheet 27)

(Joins sheet 29)

(Joins sheet 32)

1 810 000 FEET

1 800 000 FEET

1 790 000 FEET

170 000 FEET

Salt River

Fox Creek

Fox Creek

29

N

1 815 000 FEET

(Joins sheet 25)

1 180 000 FEET

Ripyville

McBrayer

Salt River

Bear Branch

Creek

Gilbert Creek

Clay Lick

BLUE GRASS PARKWAY

KENTUCKY RIVER

WOODFORD COUNTY

MERCER COUNTY

SOUTHERN

(TOLL)

The Mound

(Joins sheet 28)

(Joins sheet 33)

(Joins inset, sheet 32)

1 835 000 FEET

170 000 FEET

5,000 Feet

1 Kilometer

Scale - 1:20000

30

N

5 000 Feet

1 Kilometer

Scale - 1:20000

1 760 000 FEET

165 000 FEET

155 000 FEET

1 740 000 FEET

(Joins sheet 26)

(Joins inset, sheet 34)

(Joins sheet 31)

(Joins sheet 34)

Klondyke

Johnsonville

Sparrow

WASHINGTON COUNTY

ANDERSON CO

LOVE RIDGE

Watts Run

Mud Lick

Little Beaver Creek

Beaver Creek

Stevens Run

Elb Creek

EfE EdC FdC FdD LwC LwB ElB ElC No Ne


1 765 000 FEET
(Joins sheet 27)
165 000 FEET
(Joins sheet 30)
155 000 FEET
(Joins sheet 32)
(Joins sheet 35)
1 785 000 FEET
Bear Creek
Beaver Creek
BAXTER RIDGE
Ashbrook
Puncheon
Tuckers Branch
BLUE GRASS PARKWAY
(TOLL)
MERCER CO
53
53
Scale - 1:20000
5 000 Feet
1 Kilometer
N
31

ANDERSON AND FRANKLIN COUNTIES, KENTUCKY — SHEET NUMBER 32

32

N

(Joins sheet 28)

(Joins sheet 31)

(Joins sheet 33)

1 810 000 FEET

1 790 000 FEET

165 000 FEET

5 000 Feet

1 Kilometer

Scale - 1:20000

MERCER COUNTY

Salt River

Lick Creek

BLUE GRASS PARKWAY TOLL

WOODFORD COUNTY

KENTUCKY RIVER

1 842 000 FEET

1 837 000 FEET

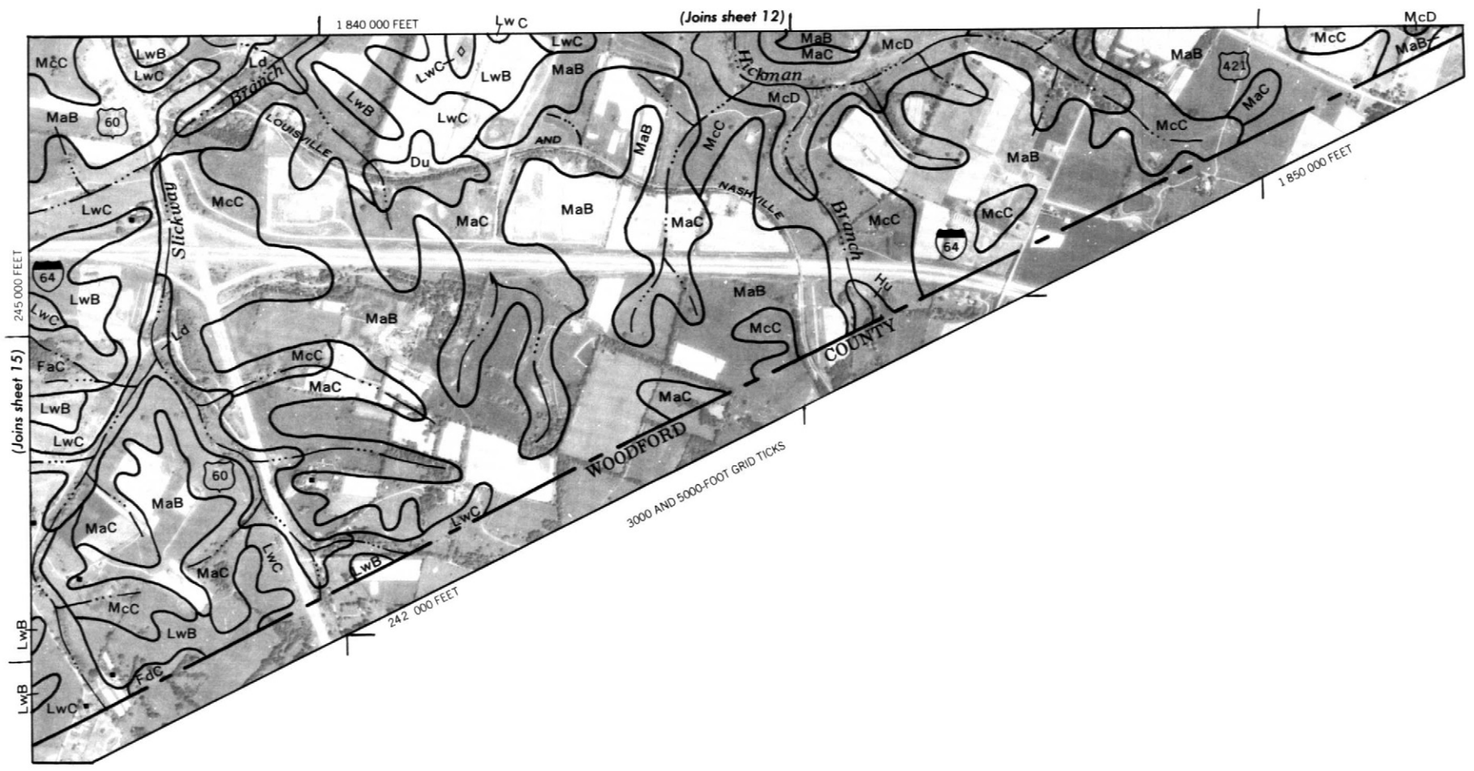
172 000 FEET

167 000 FEET

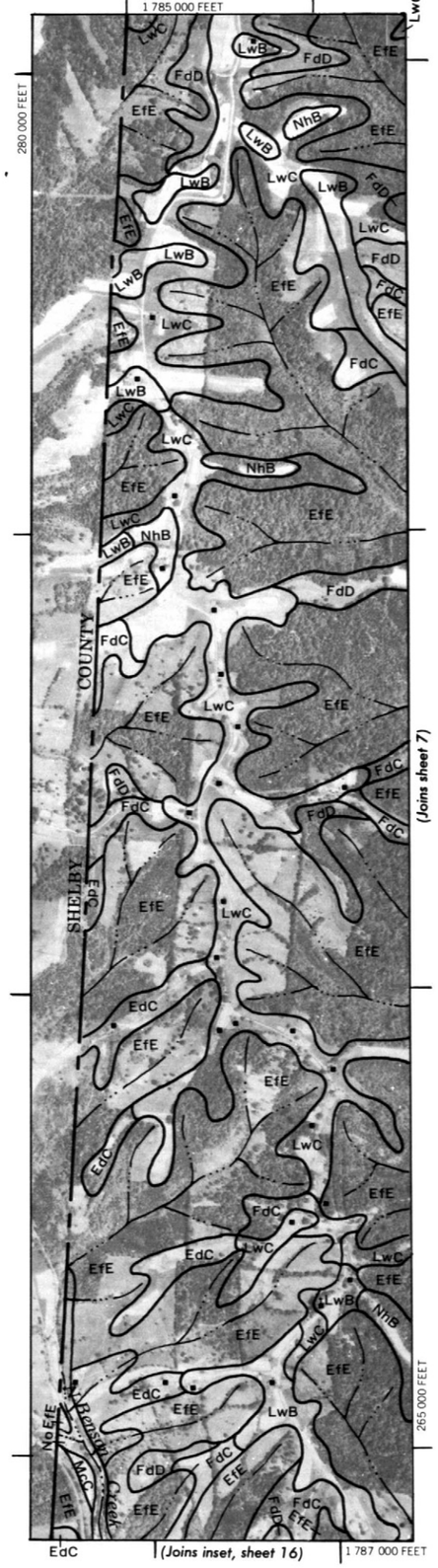
(Joins sheet 29)

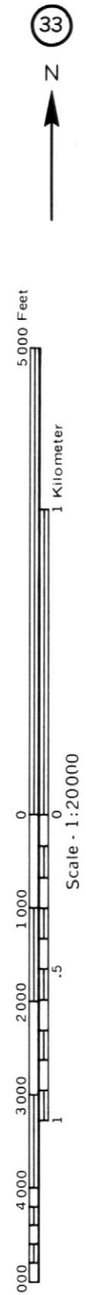
ANDERSON AND FRANKLIN COUNTIES, KENTUCKY — SHEET NUMBER 33

INSET A



INSET B





34

N

Scale - 1:20000

5 000 Feet 0 1 Kilometer 0

1 000 2 000 3 000 4 000 5 000

.5 1

(Joins sheet 30)

1 745 000 FEET

150 000 FEET

135 000 FEET

1 740 000 FEET

LOVE RIDGE

NELSON COUNTY

WASHINGTON COUNTY

Beaver Creek

EfE EdC FdC FdD LwC No

(Joins inset, sheet 18)

1 738 000 FEET

165 000 FEET

155 000 FEET

1 737 000 FEET

(Joins sheet 30)

1000 AND 5000-FOOT GRID TICKS

INSET A

(Joins sheet 30)

1 760 000 FEET

1 755 000 FEET

(Joins sheet 35)

Fairview

PARKWAY (TOLL)

BLUE GRASS

Sulphur Creek

1291

N

1 765 000 FEET

150 000 FEET

(Joins sheet 31)

(Joins sheet 34)

Beaver Creek

Sulphur

WASHINGTON

COUNTY

Beechroot

Creek

Branch

Raise

Branch

Lick

COUNTY

Cheese

MERCER

COUNTY

PARKWAY

TOLL

GRASS

BLUE

INSET A

1 786 000 FEET

310 000 FEET

HENRY COUNTY

SHELBY COUNTY

305 000 FEET

(Joins sheet 1)

1 788 000 FEET

2000 AND 5000-FOOT GRID TICKS

1 785 000 FEET

135 000 FEET

5 000 Feet

1 Kilometer

Scale - 1:20000